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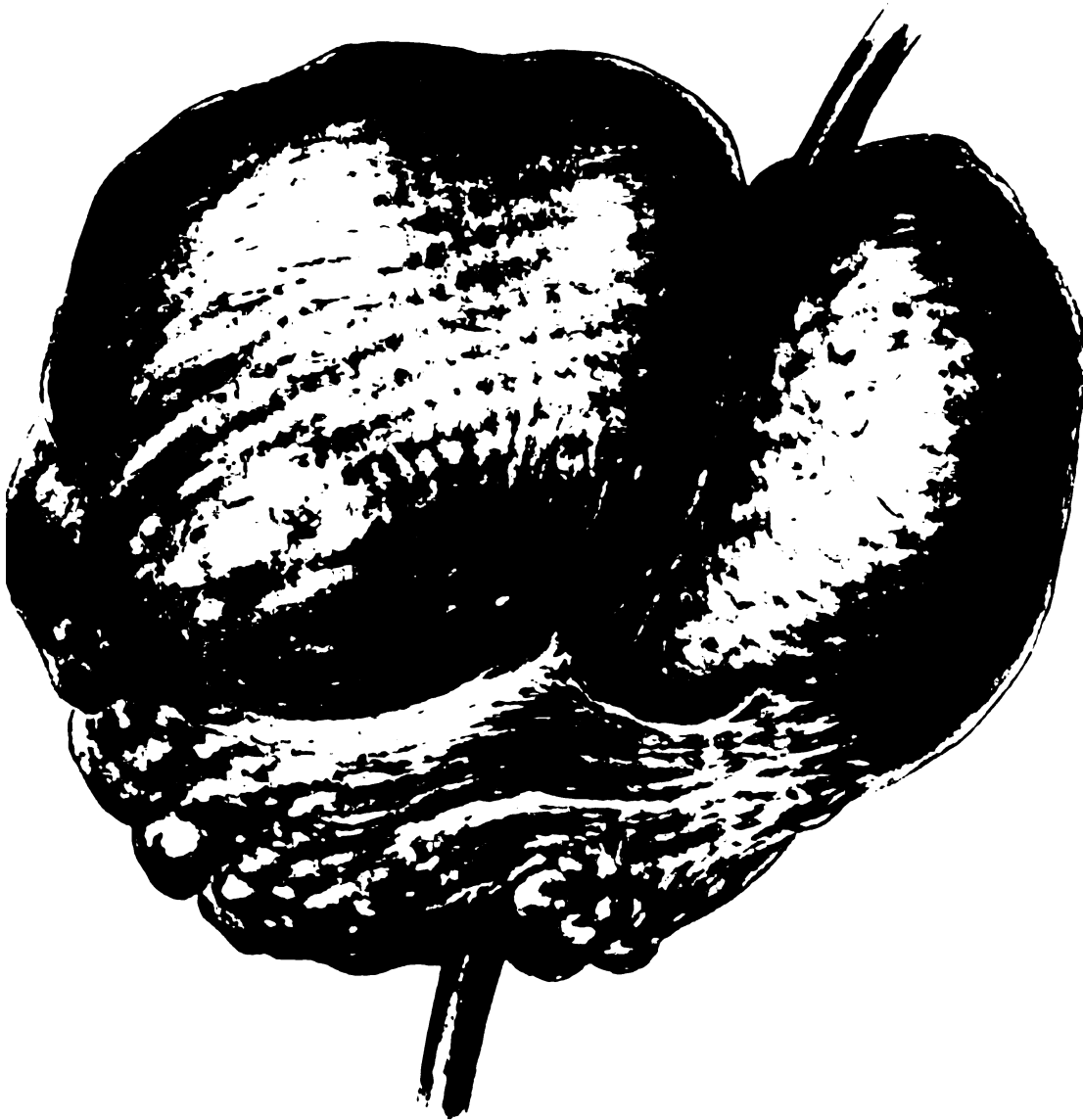
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INTERNATIONAL CLINICS

A QUARTERLY

OF

ILLUSTRATED CLINICAL LECTURES AND
ESPECIALLY PREPARED ORIGINAL ARTICLES

ON

TREATMENT, MEDICINE, SURGERY, NEUROLOGY, PÆDIAT-
RICS, OBSTETRICS, GYNÆCOLOGY, ORTHOPÆDICS,
PATHOLOGY, DERMATOLOGY, OPHTHALMOLOGY,
OTOLOGY, RHINOLOGY, LARYNGOLOGY,
HYGIENE, AND OTHER TOPICS OF INTEREST
TO STUDENTS AND PRACTITIONERS

BY LEADING MEMBERS OF THE MEDICAL PROFESSION
THROUGHOUT THE WORLD

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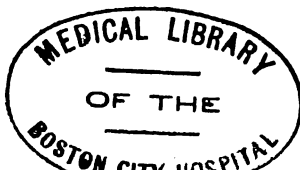
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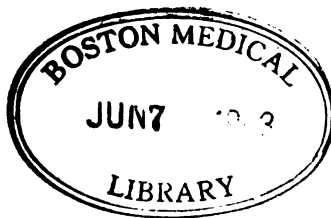
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1910



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Diagnosis and Treatment

TREATMENT OF CARDIOVASCULAR DISEASE

A CLINICAL LECTURE DELIVERED DURING HOME-COMING WEEK AT
THE UNIVERSITY OF PENNSYLVANIA

BY JAMES TYSON, M.D.

Professor of Medicine in the University of Pennsylvania

NON-MEDICAL TREATMENT

THERE is no set of diseases the successful treatment of which rests on a more rational basis than those classed under the heading cardiovascular disease. Prior to 1859 their treatment was purely medicinal. At the present day the non-medicinal treatment is at least as important as the medicinal. To Prof. Beneke, of Marburg, Germany, is assigned the credit of placing on a scientific basis the physical or non-medicinal treatment. Beneke was professor of pathological anatomy in the University of Marburg, but also practised medicine in the adjacent town of Nauheim.

Let us first see with what we have to deal in cardiovascular disease. Primarily and chiefly there is deficient propulsion of blood through the vascular tube, resulting in engorgement and dropsical transudation, causing further embarrassment to the circulation and, at times, rupture of a vessel with extravasation of blood. Such feeble circulation is always present, though in varying degree, and it is evident also that the energy of treatment must vary correspondingly.

Let us suppose our patient presenting the first stage of the morbid state in which, if recognized, successful treatment is commonly easy, that in which there is a simple weakness of the heart with scarcely appreciable hardening of the arteries, producing a slight swelling above the shoe tops at the end of the day which passes away during the night's rest in bed. The first indication is to diminish the burden which rests on the heart, to lighten the load

as it were. This is best accomplished first by rest in the horizontal position, in which it is easier for the heart to propel the blood around to the starting point, thus favoring also absorption of transuded serum. This is what happens during the night while the patient is at rest, when the slight swelling referred to disappears, to be replaced the next evening by a return of œdema if he is much on his feet. Permanent benefit is obtained by prolonging hours of rest and avoiding fatigue and over-exertion.

The next or rather concurrent indication is to strengthen the heart. This is favored by the rest just referred to. It is efficiently aided by general massage, which I regard as a most valuable agent in this or any stage of the disease. Its precise mode of action I may not be able to explain, but that it is most efficient I can attest from abundant experience. It probably acts in more ways than one. In the first place it equalizes the circulation of blood and lymph outside the blood-vessels and renders easier the work of the heart, as does rest, thus permitting the organ to recover its tone and strength. Massage may stimulate the formation of red blood-cells, improving thus the nutrition of the entire body and rendering firmer and stronger the muscles which thus more firmly encase and support the vessels. The intestinal secretions may also be increased and constipation corrected, especially in the mild degree under consideration, but forcible abdominal massage must be avoided in severe forms, since pressure on the abdominal viscera tends to produce increased blood-pressure and cardiac strain. The only drawback to massage is that of added expense, which may make it a hardship to a certain class of patients. This could be obviated in part by the physician himself practising it although such practice evidently has its limitations, since it seldom happens that much less than an hour should be allowed for a single treatment. In many cases where the degenerative changes of age have set in, but are not yet far advanced, such advance may be arrested and the old kept young for an indefinite period, by the course above described.

In this mild and in a severer degree too, the Nauheim baths become serviceable either abroad or at home. They have become so frequent a measure of treatment that I may be pardoned for considering briefly their *modus operandi*, so far as ascertainable.

Three elements enter into their constitution, viz., temperature, mineral salts in solution, and carbonic acid. An ordinary fresh water thermal bath above 35° C. (95° F.), this being assumed as the point of indifference, dilates the superficial vessels, lowers the blood-pressure after a brief rise, increases the volume and frequency of the pulse, and facilitates the circulation, in a word, rests the heart. On the other hand a cool bath, say at 25° C. or 77° F., contracts the superficial blood-vessels, drives the blood into the brain and abdominal viscera, increases the blood-pressure, and slows the pulse, in a word, stimulates the heart.

The effect of carbonic acid in the Nauheim bath is held to be that of a stimulant to the nerve-endings, thence to the proper nerve centre whence it is sent centrifugally to the vasomotor system and cardiac ganglia. But in addition there is another peculiar effect. It is that of an ordinary thermal bath a few degrees warmer, so that a water bath at 33° C., or 91.4° F. may feel cool while a carbonic acid bath at the same temperature may feel warm. Thus it is possible to take a bath at a lower temperature than would be safe with ordinary water. This increased warmth of surface in the carbonic acid bath, due to the millions of minute carbonic acid bubbles attached to the skin, I have myself experienced associated with a redness evidently due to hyperæmia. This should be borne in mind in imitating Nauheim baths at home where the reduction of temperature in the bath usually recommended as the treatment progresses is not so well borne in the absence of carbonic acid as in its presence. *Per contra* with a cool carbonic acid bath the superficial vessels are first contracted by the cold and afterwards dilated by the stimulus of the carbonic acid. Thus the alternating effect of contraction and dilatation is brought about. It is claimed, too, that a carbonic acid bath may be stimulating or soothing according to the temperature at which it is given, the bath above 37° C. (98.6° F.) being said to be soothing while that below is more stimulating.

And what is the action of the mineral matters in the Nauheim bath, chiefly chloride of sodium and chloride of calcium in large amount? It is conceded that their absorption by the skin of the patient plays no important rôle, although this was at one time claimed. On the other hand it is held by those who have studied

the baths that crystals of these salts are deposited on the skin of the patient and remain there for some time after the bath. Further that these mineral salts are hygroscopic and the thin layer of deliquescent salts diminishes the surface evaporation and loss of heat, rendering the body less susceptible to sudden variations in temperature and thus saving the work of the failing heart. I confess this claim seems to me somewhat fanciful. That the Nauheim bath does, however, have a distinctly improving effect on certain cases of heart disease I can also attest. Granted that the effect in general is stimulating, it is evident from what has been said that such effect is complex in origin. It is due in moderate measure to the action of the salts upon the blood-vessels, and possibly the mechanical pressure of the water upon the same; in decided degree to stimulation of the nerve-endings by carbonic acid, a stimulus which extends to the heart; to the thermic effect of the carbonic acid above described, and last but not least to the thermic effect of the warm water already described. The therapeutic results are summed up by Theodore Groedel of Nauheim in a recent paper as follows:

"In favorable cases, under the influence of the bath cure, we observe a diminution in all the symptoms, both subjective and objective. Cold extremities become warm, cyanosis disappears, the breathing becomes deeper and quieter, the urine increases in quantity and cardiac dilatation is diminished. Sleep is improved, dyspnoea and congestive bronchitis disappear, and the patient is once more able to go up hill without distress." To these may be added the relief to congestion of the liver and pelvic viscera, with reduction in the size of the former.

In the matter of reducing the size of the heart Groedel does not go as far as some. Indeed he says much nonsense has been written on this subject although such knowledge as we do possess is more discriminatingly applied. Thus a heart physiologically hypertrophied, producing either simple hypertrophy or eccentric hypertrophy (hypertrophy with dilatation), cannot be reduced in size, indeed ought not to be, while a heart dilated by the distention of accumulated blood may be reduced by a course of treatment, though not by a single bath as claimed. Others claim more, even that after a single bath a reduction in the size of the heart can be demonstrated.

Another explanation of the apparent reduction in the size of the

heart as determined by percussion is that it is due to a change in the position of the lungs. Before the bath treatment the anterior edges of the congested lung are retracted and the area of cardiac dulness is thus increased. The congestion of the lungs being relieved by the baths the organs are better expanded, the cardiac area is more covered, and the dulness diminished as a result, while the size of the heart itself is in no way altered. On the other hand, Theodore Schott and Dr. W. Bezley Thorne, of England, who has more thoroughly studied the Nauheim treatment than any other living English or American physician, hold that the area of abnormal dulness is not due to pulmonary retraction of the lungs but that it is actual, and that when the dull area is diminished succeeding the bath it is because the size of the heart is diminished, and not because it is more covered by the lungs.

Much the same results are claimed for the home baths artificially charged with carbonic acid under pressure, but the loose way of liberating carbon dioxide by adding sodium bicarbonate and hydrochloric acid to the bath after the salts are dissolved is useless, since the acid simply bubbles through the water without adhering to the skin of the patient. In a few instances I have known cold to have been taken by patients followed by harmful results where the reduction of temperature usually practised in successive baths has been made, probably because of the defect of the carbonic acid constituent. It is this difficulty which makes the home-made bath inferior to the bath at Nauheim. None of the devices which have been suggested with a view to securing the same effect of carbonic acid as that obtained in the natural bath have been entirely satisfactory except the liberation of carbon dioxide from bath water into which it has been compressed. This can be accomplished in sanatoria and hospitals but not in private homes.

Moreover, at Nauheim the baths can be graduated most accurately by adding the "Mutterlauge" or the uncrystallizable mother liquor or waste product of the neighboring salt works, or diluting with fresh water, thus varying the stimulating effect, which may also be increased by the "flowing baths" in which the carbonated saline waters are allowed to flow rapidly into the tub and rapidly out again by overflow pipes during the whole period of immersion.

So far as I know there is no place in which the carbon dioxide is so abundantly present as in the waters of Nauheim, although similar waters in this respect are found at St. Moritz, Schwalbach, Franzenbad, Pyrmont and Spa.

A word as to cases to which the treatment is suited. It is held by the physicians at Nauheim that there are few cardiovascular conditions in which it is not applicable. In general it is not adapted to cases in which blood-pressure is high, including cases of arteriosclerosis with high blood-pressure, chronic interstitial nephritis, more particularly in the latter stages, and cases in which there has been apoplexy caused by hemorrhage or embolism, which generally means both high blood-pressure and weak vessel walls. In these the cool carbonic acid baths would be contraindicated while the warm mineral baths diluted with fresh water might be serviceable. On the other hand in arteriosclerosis where there is no increased blood-pressure, as is often the case, the baths are deemed safe and desirable. It is especially in cases of valvular disease with lost compensation that they are efficient. Myocardial weakness unless too far advanced is held to be especially favorably influenced, while aortic stenosis and aneurism, at least in the early stages, are likewise benefited. On the other hand patients with general oedema due to valvular disease are not encouraged to come to Nauheim, not because the same indications are not present, but because the bath treatment alone is not likely to be of service to them.

The strength of the heart may be further augmented by slowly increasing the demands on it, when under favorable circumstances it will respond to the call thus made. This brings us to the exercise treatment of heart disease. And in what does this consist? In the first place such exercises must be gentle and anything approaching violence must be excluded. Powerful gymnastic exercise, including cycling, rowing, running, and all games involving it are dangerous, further weakening the heart and increasing the tendency to dilatation and its serious consequences. Exercise should be gentle and stairs should be ascended slowly if at all. Walking on level ground at such rate as will not excite shortness of breath helps to strengthen the heart, and to this may be added graduated walking on ascending paths of gentle gradient. The sum of these constitutes the "Terrain Kur" of Oertel. The latter part, "hill climb-

ing," is, however, difficult to regulate so as to avoid over-taxing the heart. The "Terrain Kur" is said to be especially indicated in the fatty heart, massage in arterial sclerosis, although I know of no reason nor can I vouch for the actual facts.

Passive movements which are really an extension of massage, aid in improving the general nutrition and with it the strength of the heart. They lighten the work of the heart as do rest and massage. Resistance movements do more than this. They also exercise the heart, aiming thereby to strengthen it, and therefore require more care and judgment. On this account they should be carried out only under the direction of the physician or a trained masseur. The self-resisting movements devised by the late Dr. A. Schott and which are comparable to the Swoboda movements, so popular in this country, involve more muscular effort than is safe in many cardiac cases. Swedish movements, if judiciously carried out, are also helpful. They, too, exercise the heart. The apparatus of late years invented by Zanders and others, the use of which constitutes the so-called *mechanotherapy* admits of a better regulated application of exercises and greater precision in gradation of resistance and effort, but it is applicable only to cases able to be out of bed and to go to the institute or sanitarium.

Motoring affords an excellent means of securing the invigorating effect of fresh air and out-door life to those who are not nervous or excitable. As conditions improve golf and croquet may be permitted, moderately and cautiously increasing the exercise.

The effect of mental strain in exhausting the physical condition of the heart must also be remembered. Indeed mental strain in the form of excitement, mental fatigue, passion, or fright, is often more prompt in producing harmful results than physical effort, and from these the heart is also sometimes slower to recover, indeed sometimes never recovers. What strengthens the heart against physical strain strengthens it also against mental strain, but more can be gained by reducing mental effort of all kinds and by urging slowness and deliberation in its exercise, as well as the avoidance of excitement.

Dietetic treatment is presumably non-medicinal. Diet is of importance in the treatment of cardiovascular disease. In the milder forms it is for the most part sufficient that it be wholesome,

moderate in quantity, and simple and easy of digestion. There is danger from the ingestion of fluids in very large quantities, increasing the work of the heart and tending to over-work it. Here as elsewhere the golden mean must be sought.

In severe cases where the tissues are waterlogged, an almost starvation diet, consisting only of milk and that in limited quantity, is often serviceable in favoring absorption of the interstitial transudate and its separation by the kidneys. In such cases it is a good sign when the patient begins to be hungry.

Finally it is often useful in such cases to make incisions about an inch long behind the ankles and thus draw away the accumulated fluid. The tension of the tissues being thus relieved, such treatment is frequently followed by increased diuresis.

MEDICAL TREATMENT

Let us fancy another picture, that of a more advanced case in which compensation has been lost either on account of obstructive valvular disease or myocarditis. Here the œdema is considerable, involving the limbs and more or less the trunk. There may be some effusion into the serous cavities and the urine is scanty, albuminous, and may contain casts and even blood-cells. There is embarrassment of breathing and the patient thinks he cannot be abed because of it. Notwithstanding this he should be put to bed if possible because it is so much easier to get results with the patient in bed than when upright with gravity militating against the action of remedies. Supposing the case to be primarily cardiac and not renal it is not unfavorable for treatment, formidable as it may appear, and I rather like to get hold of such a case especially in a hospital. In this class of case the medicinal treatment comes more to the front although the mechanical treatment is not altogether useless. Supposing the case to have had no previous treatment, the first indication is for a purgative, better a saline purge or elaterium, the former preferably at first, because simple and less apt to derange the stomach. Free purgation is an essential condition for success after the latter measures.

Having purged our patient by copious watery stools, digitalis still remains the most reliable remedy with which to excite diuresis. The best preparation is the infusion of the leaves if properly made

from good leaves. For an adult 7.5 c.c. (2 fluidrachms) every six hours, i.e., 4 doses in the 24 hours is a suitable commencing dose, but should be increased to 15 c.c. ($\frac{1}{2}$ ounce) as often if satisfactory results are not secured. An equivalent dose of the tincture is 1 c.c. (15 minims) and of the fluidextract 0.1 c.c. (1.5 minims). Failing to get results caffeine citrate 0.2 Gm. (3 grains) every 6 hours may be added alternating with the digitalis. Caffeine may also be given hypodermically in the shape of caffeine sodio-benzoate 0.2 Gm. (3 grains) every 6 hours. Strophanthus may be substituted for digitalis in the same doses if the latter is not well borne, or when all that is possible is obtained from it for the time being. Sparteine sulphate, a remedy reputed uncertain, is generally given in too small doses. In doses of 0.06 to 0.13 Gm. (1 to 2 grains) every four hours it is often efficient.

There have been recently added some efficient diuretics, among which is theocin, a derivative of theobromine (dimethylxanthine), but found in such small quantities in nature that its synthetic production is alone available. For practical purposes the combination of dimethylxanthine sodium with acetate of sodium known as acet-theocin sodium or soluble theocin is most suitable, being less disposed to derange the stomach. Although not always to be relied upon it has proved in my hands one of the most powerful diuretics I have ever known. It is best given in 0.2 Gm. (3 grains) doses dissolved in water at the time used and administered at first twice a day, increased to four times a day if necessary. It is said not to affect the heart but to regulate the renal circulation. It is chiefly in cardiac dropsy therefore that it is beneficial, requiring for this purpose a kidney which is tolerably intact. Theobromine itself is a good diuretic in these cases in 0.5 Gm. ($7\frac{1}{2}$ grains) doses to the amount of 2 Gm. (30 grains) in the 24 hours. Less satisfactory but sometimes also an active diuretic is the soluble combination of theobromine with salicylate of sodium known as diuretin. It is much more uncertain and nauseous. It may be given in 0.7 Gm. (10 grains) doses every four hours and should also be freshly dissolved. Turbidity of the solution is an indication that the drug has spoiled. Agurin is another double salt of acetate of sodium and theobromine with a larger proportion (60 per cent.) of the latter, and should be a better drug but I have not had much experi-

ence with it. It is advised in doses of 0.5 to 1 Gm. (8 to 15 grains) three times daily for adults in capsules or better in solution without association with syrups, fruit juices, or mucilages. All drugs of the theobromine class are usually effective in 48 to 72 hours, and if not we should pass on to something else.

We must not forget at suitable periods elaterin in $\frac{1}{8}$ grain doses every three hours until watery stools are produced. The time-honored combination of digitalis, calomel, and squills, erroneously called Niemeyer's pill, must not be forgotten. It often causes copious diuresis where the structure of the kidney is intact. The proportions are various but most frequently they are 0.06 Gm., 0.03 Gm., and 0.06 Gm. (one grain, half grain, and one grain) respectively in a pill every three hours. Lately two new remedies have been brought to my attention. They are nucleinate of sodium and pituitrin or extract of pituitary body. The former is given hypodermically in doses of 0.015 to 0.03 Gm. ($\frac{1}{4}$ to $\frac{1}{2}$ grain) dissolved in 1 c.c. (15 minims) of normal salt solution twice a day. It is said to produce leucocytosis associated with copious secretion of urine. Pituitrin is given in 0.5 c.c. (10 minims) doses by the mouth every four hours, increasing to 1 c.c. (15 minims). In one case brought to my notice the urine in three days increased from 120 c.c. (4 ounces) in 24 hours to 1500 c.c. (50 ounces) under this treatment.

I have said nothing of nitro-glycerin. Yet I would not ignore it in the treatment of cardiovascular disease. There are often rational indications for its use, yet it is often prescribed haphazard. It is always indicated where there is high arterial tension though it is better if possible to treat high tension by the removal of its cause. Theoretically nitro-glycerin is indicated in association with digitalis to combat the musculo-arterial contraction caused by digitalis itself. It is plain that the dilating effect of the glonoin on the muscular coat ought thus facilitate the propulsive action of the heart on the blood stream, in other words, again ease up the work of the heart. How far this occurs in fact it is difficult to show.

As to the arterial sclerosis more or less associated with cardiovascular disease, the cause, if discoverable, should be removed. Iodide of potassium as a permanent vasodilator may be used in such small doses, however, as not to derange the stomach. Results can be expected only from continuous or nearly continuous use.

THE PROGRESS OF THERAPEUTICS DURING THE PAST TWENTY YEARS

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It is obvious that the recognition of a scientific fact or the discovery of a general principle must usually precede the elaboration of a device of practical value so far as human comfort and safety are concerned. Moreover, the adaptation of scientific principles along chemical, electrical, or mechanical lines requires less adjustment to complicated conditions and is less likely to be stopped by insurmountable obstacles than the attempt to remove established abnormalities of a recondite nature existing in the living body. Hence, it is inevitable that physiology, pathology, diagnosis, and surgery should show much more rapid and brilliant improvements than therapeutics. Yet, in looking back over the past twenty years, a considerable degree of optimism is warranted.

The Pharmacopœia, though wisely guided by a conservative policy, is in many respects of increasing value to the medical profession. Many comparatively useless drugs have been discarded and a more liberal spirit in the admission of new ones is evident. Uniformity of strength of galenicals, both in the general sense of approaching a definite percentage for galenicals of the same name and approximate activity, and of conforming to international standards, and in the special sense of standardizing according to active principles or, when this is not possible, according to physiologic effect, is being secured.

Thanks to the researches of the American Medical Association, the enactment of the Pure Food and Drugs Law, and the issuance of analytical tables by the United States Department of Agriculture, the medical profession now has accessible and quite accurate information as to the composition of both old and new articles which it uses or is tempted to use in the nutrition and medication of patients. Governmental and privately endowed scientific laboratories, some connected with, some independent of universities, and laboratories actuated by the business interests of manufacturers but conducted

with a commendable degree of thoroughness and a far-sighted disposition to secure genuine results, are pursuing systematic investigations along the lines of pharmacology and chemistry, as applied ultimately to therapeutics. While a large part of the work done in these institutions proves to be of negative value, there has resulted, in the aggregate, a decided improvement in the reliability of standard drugs, in the availability of aseptic preparations for hypodermatic use, in the separation of active principles, in the production of synthetical organic compounds, in the elimination of toxic and irritant by-products, in the convenience and elegance of methods of administration, and in the isolation of active principles or, at least, of concentrations of medicinal virtues.

Therapeutic nihilism has served its purpose in dispelling the credulity of empiricism and has, to a large degree, given place to a wise scepticism open to the conviction of experiment and experience.

While there are many extremists on either side, some influenced by blind prejudice, ignorance and even sordid motives, there is an increasing tendency to establish, impartially, the proper limits of surgery, of the application of vibratory forces, mechanical, psychic, and analogous methods on the one hand and of medicinal therapeutics on the other.

The germ of truth in the old fallacy of specifics has been recognized in the consistent teaching that every therapeutic measure should be directed toward some definite end, determined by physiological and pathological study or, at least, by apparently sound experience. Conversely, in an optimistic but critical spirit, diligent search is being made for means of solution of problems in therapeutics. While symptomatic therapeutics cannot be entirely abrogated, it is generally realized that the reduction of temperature does not combat a febrile process, and that drugs used for the former purpose are dangerous depressants; that pain, especially in abdominal disorders, is often a valuable index as to diagnosis and the need of surgical intervention; that hypnotic drugs are, in the long run, more dangerous and less efficient than simpler measures, such as massage, thermic applications, dietetic management, suggestion, etc., and in general that the continued or repeated use of palliatives should usually be supplanted by radical efforts at relief of the underlying condition.

It is also appreciated by the profession generally, though unfortunately not always carried into practice, that no drug or other therapeutic measure, including surgical intervention, can be satisfactory unless preceded by an exact diagnosis. This statement requires qualification with reference to the occasional necessity of affording immediate relief, especially in surgical emergencies, and also to the application of therapeutic measures as a means of diagnosis. Even in cases in which satisfactory therapeutic measures are not available, the exact diagnosis facilitates prognosis, often indicates the appropriate line of palliation, enables the patient and his friends to anticipate invalidism or death, and clearly presents a problem for future solution if possible.

Improvement, either in actual results or in the management of the case, due to better diagnostic measures, is especially to be noted in regard to the thyroid, the stomach and intestine, diabetes, blood diseases, urinary abnormalities, calculous diseases, and various infections, among which typhoid, malaria, sleeping sickness, hook-worm invasion, trichiniasis, etc., may be particularly mentioned. It must not be forgotten that from the practical standpoint the routine application of long-known diagnostic methods, even of so simple a nature as the detection of the common intestinal parasites, is of equal value with new discoveries. The availability of the X-ray apparatus, of public stations for biologic diagnosis and even of private laboratories for the routine examination of various excretions and secretions, has considerably improved therapeutics.

Educational methods have also exerted a considerable influence. Not only do medical schools require better preliminary training than formerly, and teach all branches, especially materia medica and therapeutics, more thoroughly than twenty years ago, but the necessity of continuous study by graduates is inculcated in so many ways as to have become recognized almost as a factor in competition. Meanwhile, a process of cleavage tends to separate the laity into a class, formerly satisfied with palliative therapeutics at the hands of the medical profession, but which now seeks the osteopath, the Christian Scientist or the charlatan, and a class fairly well informed as to medical science, willing to submit to refined methods of diagnosis and demanding radical therapeutic measures.

The appreciation of the importance of attacking an essentially

local process by local measures has influenced not only such well defined specialties as dermatology, laryngology, etc., but has modified the methods of treatment of the stomach, bowel, deeper air-passages, bladder, etc., and has not only favored the surgeon but has led to a broader application of drugs introduced by the mouth or hypodermatically through the study of the routes of absorption and elimination and of the sites of predilection of action. Obviously, in the literally local application of a drug, greater efficiency with less danger of toxic action is obtainable. The more general tendency to secure definite results by medication has greatly diminished the frequency of "tonic" and "alterative" medication. Hence, argyria, nephritis due to the prolonged administration of arsenic, alimentary irritation by astringent salts of iron, the liberation of tubercle bacilli and exacerbation of hyperthyroidism by iodides, the degeneration due to phosphorus, and various other insidious after-effects of drugs have been reduced to a minimum.

DIAGNOSTIC THERAPEUTICS

The great advance in diagnostic methods has almost superseded the tentative use of drugs, such as quinine in suspected malaria, mercury in suspected syphilis, hydrochloric acid to determine the acidity of the stomach, thyroid extract in goitre, etc. Indeed, the elimination of adventitious causes of disagreement by improvements in the art of pharmacy and the more exact knowledge of pharmacologic action have made it rarely necessary to abandon a carefully conceived prescription.

Various substances have been employed within the last twenty years with no intent to produce physiological effects but to determine rate of absorption, passage through the alimentary canal, kidneys, etc. Among these may be mentioned iodides, given in quickly soluble capsules—and many capsules are only slowly soluble—to determine gastric absorption; or in salol or keratin-coated capsules to determine the time of entrance into the intestine; or inclosed in capsules requiring digestion or in rubber dam tied with catgut, to determine digestive rates, in all of these cases the saliva being tested. Salol and some other substances theoretically decomposed only in the intestine are supposed to mark the time of passage into the intestine by the appearance of salicylic or other characteristic

compounds in the urine. Various fallacies render these tests of little value.

Methylene blue, etc., are also used as tests of renal permeability or, if this is normal, are employed as substitutes for iodides in testing gastric peristalsis. Charcoal, carmine, foods having characteristic residues, innocuous foreign bodies, etc., are employed as indicators of the rate of intestinal peristalsis. The same, as well as mineral oil, odorous substances like peppermint and, in the case of an intestinal fistula low down, colored solutions, are used to determine the patency of the bowel in cases of suspected occlusion.

The writer has employed sodium bicarbonate as a crude test for gastric acidity, having recourse to the stethoscope to detect effervescence. Water alone may be used as a test of œsophageal peristalsis, listening for the bruit at the cardia, and to determine by auscultation the approximate location of the stomach, as in cases in which by auscultatory percussion, etc., resonant areas are made out but with doubt as to transposition of viscera, extreme gastropnoxis, etc. The writer for a long time has employed a suspension of bismuth to locate the stomach by the X-rays and this method is now elaborated to show size, shape, location, peristaltic power, etc.

Einhorn's bead tests of digestion, absorption, peristalsis, etc., may also be mentioned in this general connection.

The tests of glycogenic function by sugars, the phloridzin test, the use of various indicators and dyes to color secretions *in situ*, also deserve mention. It has recently been claimed that levulosuria after the administration of 100 Gm. of this sugar indicates hepatic failure, especially in cirrhosis. Analogous diagnostic uses of chemicals are subject to modification in many ways, for many purposes.

Aside from the exanthemata, there are few infections whose germs are not known and it is mainly a matter of municipal and state equipment and of the elaboration of convenient methods of examining the blood and discharges, to render bacteriologic diagnosis sufficiently prompt for practical purposes. For typhoid and syphilis (Wassermann-Noguchi method) macroscopic reactions *in vitro* are quite easily obtainable and are apparently reliable in about 90 per cent. of cases, either positively or negatively.

Quite closely comparable to the crude diagnostic therapeutics

of the past are the various tuberculin reactions. The general, mainly febrile reaction, from subcutaneous injection of tuberculin, is quite satisfactory as applied to cattle but various contraindications as well as the uncertainty with regard to a neurotic temperature exist in human practice. The ophthalmic test (Wolff-Eisner and Calmette) has produced a dangerous degree of inflammation, especially in repeated tests, in a few instances and the action of purely adventitious irritants may produce a false reaction. In one of the writers' cases, a unilateral rhinitis was also produced. Von Pirquet's method of applying the virus (old tuberculin) and of checking the result, is quite analogous to antivariolar vaccination. Moro's method by inunction of a lanolin ointment containing tuberculin produces a dermatitis and development of papules in positive cases. Detre has elaborated Von Pirquet's method, by employing a blank control, an inoculation of old tuberculin, and that of filtrates of human and bovine strains of bacilli. As the tuberculous patient is more sensitive to a filtrate than to old tuberculin, we have, to some degree, a quantitative determination, as well as a differentiation of the variety. While the tuberculins, as ordinarily marketed, are usually human for the Moro and Von Pirquet tests and of mixed origin for the ophthalmic tests, it is obvious that differential methods may be applied.

PROPHYLAXIS WITH GERM PRODUCTS

Antivariolar vaccination, which has been fairly well proved to be an inoculation with protozoa of essentially identical nature with those of variola, but mitigated by the short-circuiting of their life cycle, remains the most satisfactory of all biological methods of prophylaxis and, by revaccinating every 5-7 years and in the presence of a threatened epidemic, fails of its object in less than 1 per cent. of cases, and even the few cases in which smallpox develops after vaccination, are mainly of mild type—varioid.

Diphtheria antitoxin possesses marked, though less perfect, prophylactic value. Terribile, for instance, reports a series of 2500 exposed persons, treated with 1000 units each, with only 17 developed cases and no deaths.

Antityphoid vaccination as elaborated by Sir. A. E. Wright, has, according to military statistics, reduced both the incidence and the mortality of developed cases by about one-half.

Similar results have been obtained by the use of serums against plague and Asiatic cholera; indeed, in some cases, only a tenth or twentieth of the prevailing incidence and mortality have been noted in injected series.

Protective inoculations against chicken cholera, anthrax and swine plague have proved valuable in veterinary practice, but the occasional deaths due to anthrax inoculations preclude the use of this method in man. Favorable results in the prophylaxis of tetanus and, especially, hydrophobia, have been reported, but obviously the statistics cannot distinguish between exposure and actual infection. In general it must be considered that the conditions affecting a series under observation and especially of persons of sufficient intelligence to foresee the danger and to submit to prophylactic measures are much more favorable than for an entire community.

THERAPEUSIS BY GERM PRODUCTS

Recent literature shows almost no attention to vaccination after the development of variola.

The efficacy of diphtheria antitoxin in an average dose of 3000 units cannot be contested; though the mortality remains fairly large, especially in laryngeal cases. Moreover, it should be remembered that the antitoxin treatment has followed diagnostic methods which detect a large proportion of mild cases, formerly not diagnosed at all or considered as "follicular" amygdalitis, etc.

In regard to tetanus, there is a tendency to insist upon intradural injections. Hoffmann, for example, records the recovery of only 6 of 13 cases injected subcutaneously, but of 14 of 16 cases injected intradurally.

Flexner's serum for *Diplococcus intracellularis meningitidis* and Ehrlich's for sleeping sickness have apparently given good results.

It is impossible to weigh the evidence with regard to vaccination and serum treatment of infections generally. Naturally, preliminary reports are favorable; then follow adverse criticisms, perhaps based on prejudice or due to imperfections of technic. The view with regard to vaccine treatment of staphylococcus infections is generally favorable, but conservatives claim equally good results for local antiseptic methods. So, too, the method of preparing a

vaccine from the infective elements of a particular case, while enthusiastically supported by those making a specialty of such work, is opposed as time-consuming by those who favor more direct but older methods of therapeutics.

The use of bacteria of one kind to combat those of a more virulent nature has made some progress. Anaërobes are used to destroy dangerous specific germs in sewage; lactic acid bacilli are certainly of great value in reducing the activity and numbers of the colon bacillus, *Bacillus aërogenes capsulatus*, and putrefactive intestinal germs generally, and Liefmann has claimed, on rather scant evidence, that the typhoid bacillus, even in healthy bacillus-carriers, may be thus eliminated. A word of caution is in order against the present tendency to use buttermilk promiscuously, in gastro-enteric disorders, even when lactic acid fermentation is already excessive. The intentional implantation of erysipelas upon malignant tumors is not regarded as justifiable, though certain accidental infections of this nature have apparently checked the malignant process, at least temporarily. Coley, however, reiterates his claims for the control of inoperable sarcoma by implantation of the combined toxins of the *Micrococcus prodigiosus* and of the *Streptococcus erysipelatis*.

ANIMAL EXTRACTS

In the broad sense, this term may be applied to the following groups of substances: (1) Active principles elaborated by a ductless gland or portions of glands with ducts but not tributary to the duct; (2) ferments; (3) special organic substances secreted or collected by some special gland; (4) substances produced by reactive antagonism to the first two classes. It has been established by experience, as, indeed, should have been obvious *a priori*, that ordinary nutrient matters, salines, etc., present in an organ, have no special value in the nutrition or therapeusis of the corresponding human organ, and hence what at one time threatened to become an absurd school of therapy has been aborted. It is also recognized that an essentially excrementitious substance cannot be expected, except under peculiar circumstances, to have therapeutic value. In regard to the last point, it may be observed that the purins include xanthine bodies which lack only methyl side-chains to be identical with theine, caffeine and theobromine. Naturally, the use of meat

extracts rich in excrementitious substances of this group will have stimulant properties which may at times be indicated. So, too, the clinical observation that gouty and lithæmic individuals are relatively resistant to tuberculosis has led to the use of nuclein and its congeners, and even to urea as a mode of treatment not without value.

While we may confidently expect therapeutic discoveries of great value from the physiological and pathological studies of the parathyroid, thymus, hypophysis, and islands of Langerhans, and perhaps even from the search for substances influencing the oxidation of fat and thought to be derived from an internal secretion of the testicle and ovary, it must be admitted that at present the sole extract of a ductless gland having a practical value in the therapy of that gland is iodothylin, or corresponding extracts. The administration of thyroid extract is of the utmost efficiency in the treatment of various conditions of depressed thyroid secretion, including not only myxœdema but cretinism, some forms of obesity and various atypical nutritional disorders of the elderly, the last often requiring the therapeutic test for diagnosis. Obviously, such therapy cannot ordinarily produce a cure in the sense of restoring thyroid function nor will the results in so marked a congenital deficiency as cretinism be all that might be desired.

In hyperthyroidism, notably of the exophthalmic form, thyroidectin, prepared from the blood of thyroidectomized animals, and antiserum prepared in accordance with the general principle of producing immunity by ascending doses, have in many cases given good results. The writer has caused the disappearance both of symptoms and of goitres of considerable size by the alternate use of heavy doses of lead, aluminum and other chlorides, and of adrenalin. Hyperthyroidism, like hyperchlorhydria, tends to a spontaneous exhaustion of the superactive cells and to a final stage of opposite nature, a fact of importance both prognostically and in the regulation of the treatment.

Adrenalin or a less specific extract of suprarenal has not proved to be of much, if of any, value in Addison's disease, probably because the disease depends largely on the underlying tuberculous, cancerous or other cachexia and is not limited to the suprarenal. However, adrenalin is satisfactory as a vascular constrictant and,

apparently, acts similarly on the heart and perhaps the uterus. Its use as a hæmostatic will be considered elsewhere. The writer has found it efficient as a general cardiovascular tonic but has discontinued its use, pending the settlement of the dispute with regard to the production of vascular lesions ascribed to it on the ground of rather exaggerated experimental tests. It has been prepared synthetically, along with analogous *m-p*-dioxybenzenesubstituted-aminoethane products.

Ferments have proved to be of less value than might have been anticipated. Digestive ferments remain the only ones available for therapeutic purposes and, at least for the stomach and probably for the intestine also, ferment failure is exceedingly uncommon and when it does occur other factors usually render the mere addition of digestive ferments comparatively useless. Aside from the coagulation of milk and partial peptonization of foods outside the body, digestive ferments are to be employed mainly with the idea of forcing nutrition and, for this purpose, the vegetable ferments, derived from the pawpaw, are more active and less influenced by chemical reaction.

It is not unreasonable to hope for glycolytic ferments in the treatment of diabetes and for ferments to regulate fat deposit and resorption and even for such as may profoundly modify various metabolic processes as yet vaguely understood.

ANTACID AND ANTALKALINE THERAPEUTICS

With no additions to the armamentarium, this branch of therapeutics now rests on a very satisfactory basis. In the case of the stomach, by titration, estimation of the average bulk of meals, and with the knowledge of the saturation values of different proteid foods, we may quite accurately gauge the dose of hydrochloric acid or of a fixed alkali. In hyperchlorhydria, by an appropriate diet rich in carbohydrate and fat, but poor in chlorides and in sapid substances, including meat extractives which stimulate the oxyntic cells, we may rapidly, though not permanently, reduce the secretion of acid.

The urine, both with reference to lithiasis and as an indicator of systemic reaction, has an average normal acidity of about 25 or 35 degrees, though subject to wide fluctuations. The writer has

also shown that the total daily elimination of *acid units*, that is, the product of degrees of acidity and cubic centimetres, should be about 40,000 or 50,000. With these data, and having at hand magnesia, the bicarbonates, and vegetable acids and their alkaline salts on the one hand, and on the other hand salicylates, benzoates, and a diet rich in nuclein compounds, the control of urinary and systemic reaction is feasible. In endocarditis, diabetes, and various other metabolic disturbances and in tendencies to lithiasis of one or other form, such control is important. While the solution of calculi is necessarily tedious and often practically impossible, there is no obvious reason why it may not be possible in selected cases, and prophylaxis against most urinary calculi is perfectly feasible.

DIABETES

Aside from the direct antacid treatment often indicated in diabetic cases, it is well established that a minimum of about 80 Gm. of carbohydrate a day is necessary to prevent the development of acidosis. Certain other very simple facts have also greatly improved the routine treatment of diabetes. The appreciation of the necessity for early diagnosis, of the fact that gluten flours contain a large proportion of carbohydrates, that the toleration of various cereal and vegetable foods depends mainly upon differences in proportionate content of carbohydrates and in digestibility, that levulose or lactose may be tolerated when dextrose and saccharose are not, that saccharin and its analogues do not satisfy the craving for carbohydrates and are toxic, that the therapeutic value of yeast depends upon its destruction of carbohydrate and introduces a further pathologic state, and that anodynes act merely by depressing function, may be mentioned. Researches on the pancreas have concentrated our hopes on the discovery of some practical means of securing glycolysis. Strontium salicylate seems to have acted favorably in certain cases. On the whole, the results in diabetes are by no means brilliant but depend upon rational, mainly dietetic, measures, and the attention to acidosis at its incipency.

BILIARY LITHIASIS.

Gall-stones have been shown to depend largely, perhaps essentially, upon infections of moderate virulence, below that necessary

for frank suppuration, the colon and typhoid bacilli being important factors. While the claims of various solvents have been exploded, it has been shown that the bile acids or their salts and salicylates promote a free flow of bile. Thus, in addition to well understood hygienic measures and those directed toward relative intestinal asepsis, it may be claimed that we can do much to prevent the formation of calculi, that we may palliate symptoms due to infection and inflammation, prepare the way for operation under favorable conditions, or even postpone it indefinitely in many instances. There is no manifest absurdity in attempting the gradual solution or at least disintegration of calculi of moderate size and density and consisting mainly of lecithin, as indicated by negative X-ray examination. At any rate, calculi certainly are passed in many cases, and not only do symptoms considered as clearly demanding operation cease, but operation often reveals an empty bladder.

DIETETICS

While this subject is still neglected by the majority of the profession, much work has been done to place it upon a proper scientific basis both by the establishment of theoretical principles and by the adoption of exact empirical observation. In the past, dietetics has been largely qualitative or, when quantitative limits have been assigned, they have been in accordance with time-honored notions. In too many instances the term *dieting* has implied an arbitrary restriction to a single or to a few food-stuffs, inadequate both quantitatively and qualitatively. In others, a principle, correct in itself, has been applied to the exclusion of qualifying principles. For instance, in diabetes, the inability of the body to oxidize sugar derived from starches, has been kept in view to the exclusion of the equally important principles of the limit of the fat-digesting function and of the tendency to toxæmia from derivatives of nitrogenous metabolism and of acid intoxication from an excess of fats. In typhoid, the indication to avoid mechanically and chemically irritating food has often resulted in a diet inadequate in calories, containing too much water, toxic by reason of an excess of meat extractives and dangerous both locally and systematically by favoring the development of a strain of especially virulent intestinal saprophytes.

Pawlow's work has placed on a definite basis the principles, long vaguely understood, that secretion of digestive juices depends largely upon psychic stimulation by appetizing and almost necessarily varied foods and that a digestive secretion, notably hydrochloric acid, is stimulated by ingredients of the diet requiring that secretion for their digestion, while, conversely, ingredients not requiring a special secretion tend to inhibit that secretion or, rather, negatively to allow it to decline.

More exact study of the chemistry and mechanics of digestion, both in general, and as applied clinically to the individual case, has afforded a rational guide to the amount, consistency, and times of administration of food, so that there is a strong tendency to correct the vagaries of teaspoonful doses of liquid nourishment on the one hand and of stuffing the patient on the other, and also those of meals so frequent as to allow no periods of rest or so infrequent as either to involve over-distention or deficient nutrition.

To a large degree, faulty diet has been due to simple ignorance of the qualitative and quantitative composition of food-stuffs, to an adherence upon dishes supposed to be particularly suited to the sick but originating with housewives and untrained nurses absolutely lacking in knowledge either of the composition of food-stuffs, the effects of cooking or the physiology of digestion and metabolism. In many instances, patients have been improperly fed merely because abstract knowledge has not been practically applied or because scientific fact has been rated below rules of thumb originating with ignorant persons.

Governmental analyses have, well within the period covered by this paper, rendered accessible, the composition of almost all food-stuffs in gross waste, protein, fat and carbohydrate. The summary of various observations, as well as much original work by I. Walker Hall has increased our knowledge of the action of nucleins, their various compounds, and ultimately, the purin bodies, in the system and has rendered it possible to limit their amount in the diet. Urgently needed are analogous analyses with reference to salines, vegetable acids, more or less toxic and medicinal constituents of food stuffs, etc. The Pure Food and Drugs law has already had a beneficial effect on the available dietary as well as the *materia medica* and various systems of inspection and legislative control

of foods, with reference to specific infection, prevention of decay, avoidance of adulterants or chemical preservatives, limitation of periods of storage and purely economic details either have exerted or may be expected to exert a beneficial influence upon the food supply.

It is obviously impossible to consider dietetics in detail, but it is significant that a growing minority of the profession is giving to foods the same critical attention as to drugs. This minority demands an analysis, approximate but practically adequate, of crude food-stuffs, applies physiological facts to foods as well as to medicines, tabulates information as to minimum and maximum requirements, routes of absorption, effects in the alimentary canal, on the excretory organs and the system generally of absorbed nutriment, its concomitants and derivatives and realizes the importance of dosage as applied to foods.

The following points may be mentioned as indicating definite improvements in dietetic therapeutics: Chittenden's elaborate studies, establishing 50 to 60 Gm. of proteid daily, as a practically adequate ration; Lenhartz's compromise between physiological rest and nutritive needs in gastric ulcer, Schmidt's and Gaultier's attempts to place the intestinal digestion and, especially the utilization of fats, upon a definite clinical basis; the demonstration of the inefficiency of spices, aromatics and bitters to stimulate a depressed gastric secretion; various studies showing the practicability of employing fairly large nutrient enemata up to, say, 250 c.c., the desirability of employing glucose and salt in such enemata, the demonstration of the absorbability of unpeptonized albumin from the lower bowel, and the establishment of an average availability of nutrient enemata to supply approximately half of the standard minimum number of calories for a period of about two weeks. The technic of establishing nutrient fistula and of properly preparing nutrients for introduction now rests upon a fairly satisfactory basis. The harmlessness, if not the practical utility of nutrient subcutaneous injections of salt and glucose, occasionally used by the writer fifteen years ago, has been demonstrated by various authorities. Soft fats and oils may be introduced by inunction to the extent of 30 to 50 Gm. a day, although it must be admitted that there is no absolute proof of their utilization by

oxidation. On the other hand, the injection of such substances subcutaneously and, *a fortiori* intravenously, has been shown to be dangerous on account of the occasional production of fat embolism. The use of milk baths has been abandoned.

MEDICAL ANTISEPSIS AND ASEPSIS

An efficient general medical antiseptic has not been and probably never will be attained. However, in various ways, practical advance has been made toward the realization of this dream. The action of mercury in syphilis, of quinine in malaria and probably of salicylates in acute rheumatism has been explained on this basis. It has been experimentally demonstrated that syphilis may be aborted by the antiseptic action of mercury on the *Treponema* in the primary lesion. Atoxyl has been shown to have a specific action against the *Trypanosome* of sleeping sickness. The writer has found that typhoid, freed from intestinal putrefaction by measures considered later as applying to intestinal saprophytosis, is usually a non-fatal fever of two and one-half weeks' duration. Many serial examinations of cadavers have shown that trichinosis is frequently arrested and that it may have been cured by arsenic, salicylates, etc., administered under false diagnoses. Tuberculous peritonitis has been recovered from in too many cases after mere coeliotomy and abandonment of further operation to admit of explanation on the ground of coincidence and, if the present view of the influence of air or oxygen is accepted, a simple medical operation should suffice; indeed, it affords better opportunities for repetition or continuous treatment than does a major operation.

In a broad sense, anthelmintics may be included in this group. We have not only discovered that a very prevalent condition, uncinariasis, has been generally neglected or treated under false diagnosis, but already have in thymol a fairly satisfactory and probably with patience an absolutely curative drug.

The exact diagnosis and the conception of the severity of gonorrhœa have been attained. The problem of prophylaxis is being attacked earnestly. By continuous irrigation with alkalis and ordinary antiseptics and by the use of the newer organic silver compounds, considerable success in its early cure has been secured.

The general adoption of the Credé method has notably diminished an important cause of blindness.

Colloid silver, given internally, by hypodermatic, or used as the Credé ointment, though not warranting extravagant claims, has apparently relieved gonorrhœal arthritis, assisted in the treatment of tuberculosis and secured the resolution of various local septic processes.

In erysipelas and various other comparatively superficial infections, 5 to 10 per cent. solutions of menthol, salol, etc., in pure mineral oil, have hastened relief.

Antiseptic and detergent sprays, watery and oily, and vapors, have been shown to penetrate quite deeply into the respiratory passages, and while their efficacy, especially in deep-seated affections like tuberculosis, is not great, their value, even as antiseptics, in superficial and easily reached bacterial conditions is considerable. Intratracheal injections may be mentioned in the same category.

Hexamethylenamine has been shown to possess marked, though not absolute, antiseptic power in bacteriuria and, presumably, in the antecedent bacteriæmia. With proper bacteriological checking of results it should be used as a preliminary to the discharge from quarantine of typhoid patients, since about 20 per cent. of such patients excrete typhoid bacilli in the urine. Ammonium benzoate is also quite efficient and sometimes more prompt in its action than antiseptic lavage of the bladder in various non-specific infections.

As to alimentary saprophytosis, the importance of correcting digestive faults is obvious. Hydrochloric acid, though not of great antiseptic power in any strength tolerable in the stomach, nevertheless seems to have some value in this way, as in carbohydrate fermentation and possibly even in preventing infection from specific germs swallowed. Salol and its safer substitutes, salacetol and aspirin, bismuth salicylate, menthol, acetozone and many other internal antiseptics, though by no means fulfilling the requirements of the bacteriologist, certainly seem to mitigate the virulence of various bacteria. Intelligently used, such drugs control both fermentation and putrefaction in the intestine and cause the disappearance of indican from the urine. Of still greater importance is the realization that an empty portion of the alimentary canal quite rapidly tends toward a state of sterility. Gastric and colonic

lavage, properly carried out, as well as purgation, restriction of diet and change of pabulum are important means of securing relative alimentary sterility. The avoidance of food teeming with micro-organisms, the elimination of dental cavities and tonsillar crypts, and buccal cleanliness are also appreciated as prophylactics of alimentary sources of infection.

THE HEART

It cannot be said that there have been any brilliant recent discoveries with regard to cardiac therapeutics. There has, however, been an increasing tendency to direct therapy with reference to actual functional power with the assistance of sphygomanometry, and to allow reasonable amounts of exercise with regard to valvular lesions. The physiological standardizing of galenical preparations of digitalis and the isolation of digitoxin, by many considered as a substantial representative of the virtues of this drug, has led to a comparative disuse of allied drugs, in fact digitalis, strychnine and strophanthus, in order of frequency of use, monopolize cardiac therapeutics in the hands of many practitioners. Attention to the general circulation, by massage, baths, elimination of sources of toxæmia, attention to the kidneys, blood and general nutrition, are more generally and rationally observed.

TREATMENT OF HEMORRHAGE

While improvement has been made in the preparations of ergot, adrenalin is easily the favorite in the control of hemorrhages from vessels of suitable calibre. Its availability in gastro-enteric hemorrhages and the efficacy of internal administration, are *sub judice*. Local styptics are, however, almost universally recognized as inapplicable.

On account of the systemic elevation of blood-pressure by adrenalin, it is also appreciated that cerebral and pulmonary hemorrhages are generally better treated by amyl nitrite, nitro-glycerin, etc. A broad spirit is manifest, on both sides, in deciding between the medical and surgical treatment of fulminating gastric and duodenal ulcer and it is pretty generally agreed that medical treatment should be limited to physiological rest, with the aid of morphine.

It has been shown that the coagulability of the blood may be increased by the use of calcium chloride or lactate or by gelatin. Unfortunate experience has also emphasized the importance of prolonged sterilization of the last against the germs of tetanus.

On the other hand, there has been a lapse of interest in opposite, "antiplastic" measures in pneumonia and other diseases marked by a tendency to croupous exudates.

TRANSFUSION

This, a method so old that in 1675 the British Parliament felt it necessary to check it by legislation, has received a new impetus from Crile's experimental and practical work. While this is essentially a surgical procedure, its indications, especially in blood diseases, and contraindications are of supreme medical interest. Thus far the method has not proved of signal service except after hemorrhage, and hæmolysis has been reported after a repetition of the transfusion.

Physiological salt solutions have proved useful to provide a sufficient bulk of fluid for the circulation after hemorrhage, to flush toxic matters from the body, to influence osmosis in various ways, and, by temperature, to produce stimulation. For emergencies, a teaspoonful of common salt to a quart is sufficiently near an isotonic solution. The solutions may be introduced intravenously, by hypodermoclysis, into the bowel, stomach, or even into various body cavities. The hot solution swallowed or introduced by the stomach or colon or even rectal tube stimulates the hepatic and renal functions. In the anuria of cholera, hypertonic solutions have proved particularly valuable. Fenton Benedict Turck has shown that, in order to combine the introduction of fluid with a contraction of the portal vessels, a temperature of 55°C . (131°F .) is necessary and this temperature is near the limit of tolerance. A salt solution of this temperature, introduced by the bowel, is one of the most efficient means of combating shock and collapse, of whatever origin. Trunczek has taught the value, difficult of actual demonstration but strongly supported theoretically, of lime-free salines in arteriosclerosis. The writer would urge also the use of mixed salts including lime, corresponding to the blood analysis, in diluting milk for infant feeding, especially in rhachitis.

On the other hand, the use of a nearly salt-free diet is of great value in dropsy, especially when of renal origin, and has been used with some success to enable the substitution of bromides in epilepsy. It would seem, however, that at present, there is a tendency to lack of discrimination in employing this method, and fundamental physiological data are urgently needed.

ANÆSTHESIA

Efficient local anæsthesia dates back almost exactly twenty years, to the discovery of cocaine. More recently, various synthetic substitutes have been available and Gant has shown that sterile water alone may be employed, at least in certain rectal operations. Experimental work by Meltzer suggests a more general, at least abdominal, anæsthesia from cocaine. Injected into the spinal canal cocaine, stovaine, and even magnesium sulphate produce anæsthesia of the lower part of the body, but such methods are *sub judice*.

While general anæsthesia has been shown to be possible and fairly safe by ethyl chloride and various hydrocarbon mixtures, and while various means have been devised for regulating the administration of volatile anæsthetics, so as to offset the danger of partial asphyxia, and while various researches have been made as to problems connected with the dangers of anæsthetics, including the production of acidosis, there is a strong, conservative tendency to adhere to chloroform and ether, and the statistics show no marked change from the former gross death rates of about 1:2500 and 1:25,000, respectively.

For animal experiments, chloretone has proved a convenient and, apparently, efficient anæsthetic, though with too marked a fatal tendency when used efficiently to have a place in therapeutics except as an anodyne. High frequency and high tension electric currents have been used not only as anodynes and trophic stimulants in neuralgia, neuritis, etc., but even to some extent for the production of operative anæsthesia.

TUBERCULOSIS

This disease illustrates an important negative phase in therapeutics. Various antiseptic measures, by inhalation, local injec-

tion and systemic administration, violent pulmonary gymnastics including recourse to air of different pressures, absurd dietetic measures, including the overdosage with cod-liver oil, and dependence for general results upon methods of treatment perfectly proper for local pulmonary lesions and similar concentrations of effort have been practically abandoned in favor of almost exclusively hygienic measures. While it would seem that patients are often too much exposed to inclement weather and that undue faith is placed in local climatic conditions, and also that the diagnosis of incipient phthisis is often made without genuine basis, with consequent fictitious influence on statistics, the general results have been favorable.

IMPONDERABLE AGENTS

Among methods of treatment not involving the administration of drugs may be mentioned hypnotism, psychotherapy, various systems of exercise and massage, applications of heat and cold—especially local hot-air baths with specially constructed ovens—some novel variations of balneotherapy, Bier's passive hyperæmia, the Finsen, incandescent and colored-light therapy, the use of infra-red and ultra-violet rays, the emanations from the Röntgen tube, radium, etc. The demonstration of radium, or at least of some radio-active substance, in certain waters and muds, has lent support to early empirical claims for certain baths which have been regarded sceptically by those considering only the gross chemical analyses. Electrotherapeutics, meanwhile, is less in vogue and its limitations have been quite definitely learned. All such methods of treatment require special attention and equipment, are liable to be advocated with too much enthusiasm by those who make them a hobby, and on the other hand are received with too great scepticism by those unable to obtain practical experience with them. Considerable time must elapse before their merits and limitations are definitely established.

MISCELLANEOUS DRUGS

Without attempting a formal discussion, mere mention may be made of the following new, or recently appreciated articles of the armamentarium, which seem to mark actual advance in therapeutics: hydriodic acid, trichloroacetic acid, lanolin, pure mineral oil

and fat, ichthyol, bromoform, cataplasma kaolini, cocaine and its congeners, orthoform and its analogues, phenolphthalein, guaiacol and its carbonate and congeners, hexamethylenamine, homatropine, hydrastine, formaldehyde, pyoktanin, sulphonmethane and its congeners, the newer proteid compounds of silver, colloid metals, peroxides and their analogues, liquefied and solidified gases, proteid compounds of tannic acid, iodine, phosphorus, etc., lecithin, nuclein and allied compounds, and cinnamic acid.

TREATMENT OF AMŒBIC DYSENTERY

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As a general thing a mild attack of acute amœbic dysentery yields to treatment without much difficulty; but the more serious forms, especially during the chronic stage when there are extensive lesions, often resist every sort of medication and reduce both patient and physician to despair.

The number of treatments that have been devised against amœbic dysentery may be said to be incalculable. Each investigator endeavors to formulate a medication that will succeed in every case; which is a mistake, as no treatment can possibly cover all forms. Each instance presents its special indications, according to the anatomical condition of the large intestine, or even, as we shall see farther on, of the small intestine and stomach, and also individual susceptibilities, which we are obliged to take into account. It should also be remembered that the treatment by drugs is not all that we have to apply; any therapeutic course that is not combined with a special diet, which the patient must follow closely, has a very good chance of failing. For this reason we shall consider, in the first place, the different medical and surgical procedures that have been proposed; and then take up the important question of the diet to which patients of this category must be subjected.

MEDICAL TREATMENT

Guillon very properly lays great stress on the undesirability of, and even the harm that may be caused by, the use of opium in dysentery. Many of our predecessors utilized it exclusively, thinking that it was desirable to check the discharge of dysentery, as though it were an ordinary form of diarrhœa. But diarrhœa, at any rate at the height of a case of dysentery, is not a part of the syndrome of that disease; constipation, on the other hand, is one of its

best-known symptoms—the absence of fecal matter during this phase is a positive proof of this fact. The intestine must, therefore, not be closed, and opium, as well as the different absorbent remedies, such as bismuth subnitrate, must not be used. Such preparations should be given only for the purpose of quieting pain, or to diminish the ordinary colics or such as may be produced by treatment. I am quite disposed to adopt the formula of Guillon, which is, that if we use opium at all it should only be given in very small doses, enough to quiet pain but not to constipate.

Repeated purgation and *antiseptic lavages* are the two main methods of treatment at our disposal. The saline purgatives, *sulphate of sodium*, *sulphate of magnesium* and the *double tartrate of potassium and sodium*, are the most commonly employed; their favorable action is unquestionable in light cases, and even in those of average intensity, particularly when the phase of chronicity has not been reached. They must be given in small doses frequently repeated, and for several days in succession; on the first day 20 Gm. (300 grains) of sulphate of sodium, to be divided up into a number of doses; second day, 15 Gm. (225 grains); third day, 10 Gm. (150 grains); and 5 Gm. (75 grains) on the fourth, fifth, and sixth days. With this can be combined each day fifteen drops of laudanum destined to lessen the peristalsis and abdominal pain caused by the treatment. It is important to remember that a given amount of salts administered in a single dose produces a far less satisfactory result than when it is divided up into several small doses. In some cases castor oil may be administered, with a like gradual diminution in the size of the dose; but many patients dislike this remedy extremely, and in some cases of dysentery the intestine cannot stand the drastic purgation produced by this substance.

Calomel generally gives good results, and it has the advantage, as well, of possessing a marked action on the liver and kidneys; it seems often more efficacious than the saline purgatives, particularly in serious cases. Adults easily stand doses of 0.80 to 1 Gm. (12 to 15 grains); but the use of this drug cannot be continued for any length of time on account of the mercurial intoxication to which it gives rise, gingivitis and stomatitis in particular, in spite of

the preventive use of chlorate of potassium gargles. It is best to give calomel in the following form:

Powdered ipecac.....	0.40 Gm. (6 grains)
Calomel	0.20 Gm. (3 grains)
Extract of opium.....	0.05 Gm. ($\frac{1}{4}$ grain)
Syrup of rhamnus cathartica.....	q. s.

Divide into six pills, one to be taken every two hours.

Early cases of a serious nature improve under this mode of treatment, which has also given favorable results in forms that had already become chronic.

In amœbic dysentery *ipecac*, when properly administered, may be looked upon as an heroic remedy in many cases. It should be used either in the form of syrup of ipecac, or of ipecac prepared according to the Brazilian method. This method of preparation is as follows: A glass of boiling water is poured over 2, 4, or 8 Gm. (30 to 120 grains) of crushed ipecac root; this is allowed to infuse for several hours and then decanted, the resulting liquid being given to the patient. The same process may be repeated a second and even a third time with the ipecac that has been already used.

Another author makes use of the same process, but adds 30 Gm. (1 fl. oz.) of syrup of opium, and an equal amount of cinnamon water. The liquid thus obtained should either be given in a single dose, or, better still, by the tablespoonful every hour, so as to avoid nausea and vomiting. Still another method is that devised by Le Dantec: 8 Gm. (120 grains) of crushed ipecac root are put to soak in a cupful of cold water. This first maceration is decanted at the end of 24 hours. A second infusion is prepared by pouring a cupful of boiling water on the residuum of the first preparation. Finally, to form the last decoction, this same residuum is mixed with an equal amount of water and boiled. Le Dantec administers these three preparations during three consecutive days in small quantities, so that each shall last 24 hours.

In certain colonies the physicians have been favorably impressed with the results given by the use of plants of the family *Simarouba* in the treatment of amœbic dysentery. They have used either the *Simarouba* itself or the *Kho-Sam*. When the *Simarouba* is used, the bark should be infused in boiling water and then com-

bined with a few drops of laudanum. This preparation may be continued for several consecutive days. *Kho-Sam* is the seed of the *Brucea sumatrana*, a plant of the Simarouba family. The dose given at first was from 8 to 12 seeds, but nowadays the *Kho-Sam* is sold in the form of tablets, which, according to Lemoine, should be administered in the following way: First day, 4 tablets; second day, 8; third day, 12; fourth day, 8; fifth day, 4. The action of the *Kho-Sam* is quite striking in many cases, even in such as have resisted all other treatment; from the second to the fourth day, after a slight increase in the number of stools and colic, the blood disappears from the motions, the latter become fecaloid, and their number gradually approaches the normal. It is true that in some cases one course of this treatment does not suffice to effect recovery—a few days after a normal state has been reached and the treatment has been stopped, the symptoms of dysentery all appear again. But with a second, or possibly third, cure, recovery is generally final. In exceptional cases such a result cannot be obtained—the patient's condition is improved by the treatment, but a normal state of the large intestine cannot be reached, and some other remedy has to be resorted to to complete the cure. With these cases the *Kho-Sam* appears to open the way favorably for the other method, or for antiseptic lavages, in particular.

ANTISEPTIC LAVAGES.—Dysentery patients are often noticeably relieved by the direct action of antiseptics brought into contact with the ulcers of the large intestine; however, these lavages are only really efficacious when they are properly administered. The patient should be on his back, slightly inclined to the right, and the pelvis raised on a cushion. The tube should be introduced gradually and gently into the rectum, and for not more than 6 to 8 centimetres (2 to 3 inches); this tube should be connected with a receptacle held at about a man's height. The liquid should be allowed to flow slowly, and when the quantity prescribed has been given, the patient should remain for a few moments in the position mentioned above, and should then turn alternately first on one side and then on the other, so that the antiseptic used may reach if possible every part of the diseased surface. According to the supposed seat of the lesions the quantity prescribed should be 250, 500, or 1000 c.c. (8, 16 or 32 ounces). With certain patients these

lavages give rise to violent colic, accompanied sometimes by syncope; in such instances they will, of course, have to be abandoned. Each therapeutic lavage should be preceded by a lavage for cleansing purposes.

Boiled Water.—Lavages of boiled water certainly act, but only for the time being; they procure relief for the patients by washing away mechanically the mucus adhering to the surface of the intestine, but they do not effect recovery.

Nitrate of Silver.—Lavages of nitrate of silver are habitually very efficacious, but they have the serious drawback of being painful and of inducing colics that are very severe at first; it is, therefore, necessary to begin by small doses, one part in ten thousand, and to rise gradually to three and five parts. Certain authors have used them as strong as one part per thousand.

Permanganate of Potassium.—Permanganate of potassium is fairly active, but perhaps more painful even than the nitrate of silver; for the same reason as above, the first dose must be small, and then gradually increased. Begin with one and a half parts per thousand, and rise to fairly high figures; Gastinel has used it in $\frac{1}{2}$ per cent. solutions.

Quinine.—The sulphate, hydrochlorate, or hydrobromate of quinine, usually give good results, though the second two are more uncertain, succeeding with some patients and failing with others; a common custom is to give a lavage of 500 to 1000 c.c. (a pint to a quart), containing 2 to 3 Gm. (30 to 45 grains) of one of the above salts of quinine.

Creosote.—This substance has been used by various authors, and I myself have been favorably impressed with it. Dissolve 1 or 2 Gm. (15 to 30 grains) of creosote in a little oil of sweet almonds or olive oil, add 250 to 500 Gm. (a half pint to a pint) of water, and make an emulsion with the yolk of an egg. This lavage has the advantage over those that have preceded of causing little or no pain; it is also hæmostatic, and is very useful in counteracting all odor. In the majority of cases its efficacy is undeniable; after three to five days the stools become formed, the mucus disappears, and a normal condition is once more established. One serious drawback has, however, to be mentioned: certain patients show a marked intolerance for creosote, manifesting itself in smoky urine, precordial distress and syncope. For this reason the

creosote lavage must not be given carelessly; the patient must be watched very closely, and the treatment interrupted at the first sign of intolerance. I am in the habit of giving a lavage one day, and a second one two or three days after—never on two days in succession.

Hypochlorite of Sodium.—The valuable disinfecting properties of this substance have been made use of by Vincent, who begins by lavaging his patients twice a day, increasing the dose steadily from 8 to 10 and 12 Gm. (2 to 3 drams) of Labarraque's Solution to a litre (quart) of water at a temperature of 38° C. (100.5° F.); after four to eight days only one lavage is given a day. This lavage causes no pain, and the patient runs no risk of intoxication even though he retains part of the liquid. The favorable effect of this treatment is said to be very rapid: in a few days the stools become normal and the patient's general condition improves correspondingly, as is shown by a steady increase in weight.

Ipecac.—This may also be given in lavages, 2 Gms. (30 grains) of crushed root to 250 c.c. (one-half pint) of water. This is an excellent method, which in serious cases, especially in the hemorrhagic forms, proves very satisfactory.

I omit intentionally a great many other methods that have been used since those mentioned above have shown themselves to be the most reliable. As a general thing they are successful, but it is well never to forget that a single one of them will not suit every patient; this will depend on the intensity of the lesions, on their extent and duration, as well as on the organic susceptibilities of different patients. It is, therefore, necessary for the physician to feel his way, to try the effect of one of them and to change at once to another when the result is not what was anticipated. In a similar way certain patients do best on the simultaneous administration of antiseptic lavages and of some of the medicines mentioned above, such as purgatives, *Kho-Sam*, etc. This amounts to saying that each patient requires an individual treatment, and that in therapeutics, as in clinical medicine, we have to deal not with diseases but with diseased persons.

Finally, in addition to these forms of treatment we must not forget that these dysentery patients have a right to have their sufferings relieved; furthermore, certain local complications may require symptomatic treatment.

Rectal tenesmus can be relieved by intrarectal injections of a solution of cocaine in 20 c.c. (half ounce) of water; belladonna suppositories are also of help, as well as sitz baths, tepid or cold. Against abdominal pain some external medication is usually best, for instance, repeated applications of poultices or hot fomentations.

Hemorrhage requires prompt and vigorous action; the patient must remain absolutely quiet and take iced drinks; a cold poultice should be applied to the abdomen, and ergotine or calcium chloride administered. In addition to this, an enema of nitrate of silver, according to Trousseau's method, should be given, or else an albuminous enema, 200 Gm. (6 fl. oz.) with nitrate of silver 0.05 to 0.50 Gm. ($\frac{3}{4}$ to $7\frac{1}{2}$ grains) and chloride of sodium 0.50 Gm. ($7\frac{1}{2}$ grains); or else:

Tincture of iodine.....	5	to	20 c.c.	(75	to	300 minims)
Iodide of potassium.....	0.50	to	1 Gm.	($7\frac{1}{2}$	to 15 grains)
Water	200	to	250 c.c.	(6	to 8 fl. oz.)

or else:

Gallic acid.....	2	to	5 Gm.	(30	to	75 grains)
Water	200	to	350 Gm.	(6	to 10 fl. oz.)

or else:

Extract of ratanhia.....	5	Gm.	(75 grains)
Laudanum	10	drops	
Water	250	c.c.	(8 fl. oz.)

Enemas of perchloride of iron should be avoided, as they seem to favor gangrenous sloughing of the mucous membrane.

It will not be necessary for me to dwell on the treatment of other complications, such as arthritis, paralysis, hemorrhoids, rectal prolapsus, etc., that are likely to occur at one period or another of the disease, and that may be met by the general methods in use either in medical or surgical therapeutics; finally, the patient's general condition should be followed with close attention, his strength maintained, and his condition of anæmia, which is often very marked, counteracted by every possible means.

SURGICAL TREATMENT

It has been proposed of late to treat amœbic dysentery on surgical lines. Certain writers recommend an opening of the bowel

over the cæcum, through which artificial anus may be administered antiseptic lavages, which are thus certain to act on the entire surface of the mucous membrane of the large intestine. Other writers, among whom is Sir Patrick Manson, prefer appendicostomy; the abdomen is opened, the appendix found and fastened to the wall, and through this organ are injected various antiseptic liquids.

It is claimed that these methods give excellent results. Though Curl, out of eleven patients operated on, reports two deaths, he advises an operation in two stages, the intestine only being opened 24 or 48 hours after laparotomy. He is not a partisan of appendicostomy, for the following reasons: the circulation of the appendix is often endangered and gangrene may occur; again, the appendix usually furnishes an abundant secretion, which ends in producing a fistula, which is not easy to obliterate. Time alone will decide what is to be thought of these bold attempts, which can naturally only be resorted to in forms of moderate intensity, as experience has shown that serious cases are not at all suitable for them.

DIET IN AMŒBIC DYSENTERY

Nothing has to be more closely watched than the diet of dysentery patients, at the risk of the treatment failing entirely; now these patients are not easy to manage, and are capable of every deceit in order to get around the doctor's orders. It is desirable to place the intestine in a state of rest, and to keep it there as long as possible. An absolute milk diet seems to fill all indispensable conditions: as an article of food it is sufficient, easy to digest, leaves little residuum, and requires the least possible effort on the part of the digestive tract. Milk should first be given pure for as long as the patient will stand it; when he begins to grow tired of it, it can be diluted with mineral water: Evian, Vals, or Vichy, with lime, rice or albuminous water, or with weak tea. Special preparations of milk can also be used, and in this respect kephir sometimes renders immense service. Milk should be taken in small quantities very frequently repeated; this is an excellent manner of administering it to patients who naturally have a dislike to it. Given in large quantities at a time, it sets up intestinal contractions and colics. It is best administered hot.

Milk is, in short, the best possible food in dysentery; but it should be known that certain digestive tracts do not tolerate it, on account of the excessive fermentation to which it sometimes gives rise. The large intestine is not always the only part diseased in amœbic dysentery; the final portion of the small intestine, although not ulcerated, is often in a catarrhal state, while the secretion of the digestive juices may be vitiated and give a free hand to the microbes of fermentation. Now with such patients milk gives rise to an exacerbation of the intestinal symptoms and diarrhœa; when on the other hand the milk is suppressed, everything becomes regular again. These patients have, therefore, to be nourished in a diplomatic manner, and in such a way as not to interfere with the favorable action of the medical treatment that the intestinal condition requires.

In such cases it is well to prescribe oatmeal flour, racahout, and mashed peas, lentils, or potatoes, prepared altogether without milk; Italian pastes can also be used, prepared in the same way. Certain writers advise beef juice, or raw beef in the form of a pulp; this preparation, however, is not always well tolerated by the digestive tract.

The latter forms of food can also be used to follow the milk diet, in patients who have submitted to this for a certain time and have improved on it. When they stand it well it is a good plan to leave them for about two weeks on milk, counting from the day from which they have returned to a single, normal motion again. After this can be gradually added mashed vegetables, Italian pastes, various decoctions of cereals, then eggs, and finally white meat, poultry, fresh fish, brains, sweetbreads, cutlets, beefsteaks, broiled kidneys, and ham. At the slightest set-back or threatened recurrence, the milk diet should be resumed.

During convalescence beer and white wine may be allowed to those accustomed to their use, and rice water should be advised, at least as a part of the liquid taken by the patient each day.

Finally, with patients in foreign colonies, one of the best remedies is to get them home as soon as possible; thanks to this step many cases rapidly improve far more rapidly without question than if they had remained in a tropical climate, the debilitating effect of which has such an unfavorable influence on them.

DROPSY AND ITS TREATMENT *

BY HERMAN B. ALLYN, M.D.

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SINCE the beginning of my service this year on October first there have been seven patients exhibiting general anasarca. Two had mitral obstruction and dilated right heart, one had aortic insufficiency with general dilatation, one patient had acute diffuse nephritis superimposed on a chronic process, one had chronic interstitial nephritis with dilatation of the heart, one had chronic parenchymatous nephritis with cirrhosis of the liver, and one a moderately dilated heart with arrhythmia following an alcoholic debauch. The two patients with mitral obstruction, both women, were brought to the hospital in an advanced stage of failing compensation and died within a few days after admission. The patient with aortic insufficiency, also a woman, was only in the hospital a week or two and was then removed by her family. All the remaining patients are men and are still in the hospital. Some of you have seen them at close range in the weekly ward classes and are familiar with their histories. I shall therefore not take up their cases in detail, but show them to you, bring out the salient features of their cases, and make them the subject of some remarks upon the causes of dropsy and its treatment.

Dropsy means an accumulation of serum in the cells and lymph spaces outside the blood-vessels and in excess of the normal.

There have been several prominent theories as to its causation: First, the mechanical; second, the toxic and chemical theory; third, the theory of loss of vascular tonus; fourth, the theory of hydrophilic colloids.

1. *The Mechanical Theory.*—The mechanical theory is based partly upon the common observation that when the circulation is impeded in advanced heart disease, or when a vein is occluded by

* A clinical lecture delivered at the Philadelphia General Hospital, Nov. 6, 1909.

tumor, inflammation, thrombosis, or embolism, œdema very often occurs. Proof that increased blood-pressure is the cause of œdema has been sought by animal experimentation. The well-known experiment of tying the femoral vein of an animal did not result in œdema unless the corresponding sciatic nerve was also cut, and thus to venous obstruction vasodilation was also added. But œdema was found to result without section of the nerve if the leg was subject to some injury. Welch¹ tied the aortas of rabbits in such a way that the only outlet was the left carotid and left subclavian, and he obtained uniformly in animals with strong hearts a marked pulmonary œdema. In animals with presumably weak hearts, as shown by a failure to register a rise of blood-pressure in the pulmonary artery, œdema did not occur. Welch stated his conclusions as follows: "Mechanical œdema is the result of a disproportion between the working powers of the left ventricle and the right ventricle of such a character that, the resistance remaining the same, the left heart is unable to expel in a unit of time the same quantity of blood as the right heart."

Joseph L. Miller and S. A. Matthews² have recently reviewed the subject. They conclude that there is evidence of a disproportion between the working power of the two sides of the heart when pulmonary œdema is produced by the iodides, and by intravenous injection of adrenalin, but not when the œdema follows exposure to the fumes of nitric acid or ammonia, or when it results from the intravenous injection of acetic ether.

W. G. Halliburton³ quotes with approval Starling's generalization as to the causes of œdema: (1) Factors causing increased transudation, (a) increased intracapillary pressure, especially that produced by venous obstruction; (b) increased permeability of the vessel walls by local irritants, malnutrition or poisons circulating in the body generally; (c) a watery condition of the blood. (2) Factors causing diminished absorption either by lymphatics or blood-vessels.

2. *Toxic and Chemical Theories.*—The mechanical theory by itself has proved unsatisfactory to both pathologists and internists.

R. M. Pearce⁴ has recorded the result of an experimental study to determine the relative importance in the production of dropsy, of renal injury, vascular injury, and plethoric hydræmia.

He employed potassium bichromate to act on the tubular epithelium of the kidney, the venom of rattlesnakes for damaging the endothelium of vessels, and large quantities of water introduced into the stomach to produce hydræmia. When these three agencies were combined universal œdema resulted.

French writers especially have laid stress upon the fact that in nephritis there is a diminished excretion of chlorides, and upon the further discovery that in some cases the muscles and other tissues contained more than the normal amount of chlorides. They have therefore supposed that these chlorides attracted the water and so led to its accumulation in the body and the production of œdema in nephritis.

3. *Loss of Vascular Tonus*.—Meltzer,⁵ to whose admirable lectures I am indebted for much of the older literature of the subject, suggests that the endothelial cells may themselves transport fluid from the outside to the inside of the walls as the phagocytes do solid particles. He suggests also that the irritability and contractility of the endothelial cells may be controlling factors in the process of transudation. This may be accomplished by variation in the tonicity of the endothelium and through it by variation in the size and shape of the pores. He believes, however, that osmosis and diffusion on the one hand and the differences between intracapillary and extracapillary pressure on the other hand are essential elements in the production of lymph and œdema.

In normal conditions the relation between the tonicity of the cells and the chemicophysical influences are so stable that subsidiary factors, gravity for example, exert no perceptible influence upon the result. In slow but prolonged pathological conditions the first impairment of the mechanism is the loss of its stability, any subsidiary factor might bring about an increase in the process of transudation, might cause local or general œdema.

He explains cardiac œdema as due to a blood stagnation which leads to deficient oxygenation and perhaps improper nutrition of all the endothelium of the capillary walls. Hence results change in irritability and tonus of cells, and enlargement of their pores, and when gravity assists in overfilling the capillaries with blood the pores open to permit a greater transudation. The same explanation would hold true for the endothelium of the lungs, where

a moderate increase in the intracapillary pressure due to a disproportion between the energy of the right and left sides of the heart opens the pores and causes œdema.

As to renal œdema it may be that the poison which circulates in the blood in interstitial nephritis does not inhibit the tonus; hence the absence of œdema in that form of nephritis. But in parenchymatous nephritis the poison, which as Senator suggests is probably the same as causes the nephritis itself, does relax the endothelial tonus and hence in connection with chemical changes in the tissues that lead to an increase in the osmotic pressure therein is the cause of œdema. Meltzer thinks that in the final stages of interstitial nephritis, in which, as you well know, anasarca may occur as the result of cardiac complications, the permeability of the endothelium is much greater than in cardiac insufficiency alone.

These views of Meltzer have been given at some length because they furnish the best explanation of œdema that we have had hitherto.

There is no doubt that increased blood-pressure associated with some toxic or other injury to the vessels is a much more satisfactory working theory than the mechanical theory alone. But it does not meet all the requirements. Lazarus-Barlow urges that normal lymph formation and œdema formation must be the ultimate result of at least two processes, one in which the tissue cells are paramount, the other in which the blood-vessels are paramount.

Jaques Loeb discovered that a trace of acid in muscle enables it to take up fluid even from a strongly hypertonic solution of sodium chloride. He believed this to be due not to filtration by the intracapillary blood-pressure, but to the attraction of water by the tissues, i.e., to the increased osmotic pressure of the tissues as the result of some chemical changes within them.

4. *Theory of the Hydrophilic Colloids.*—More recently Martin H. Fischer⁶ declares that œdema represents nothing but an increased affinity of the tissue colloids for water. This increased affinity may be brought about in the following ways: First, in conditions leading to œdema various substances (particularly acids) capable of greatly increasing the affinity of the colloids for water are not eliminated as they should be or are produced in abnormal

amounts. Second, colloids having but little affinity for water are changed into such as have greater affinity. He regards protoplasm as colloidal, and says that hydrophilic colloids can absorb twenty times their weight of water. Fischer's experiment of tying a frog's leg tightly and then causing the leg to become œdematous by immersing it in acidulated water, seems to me to prove that the circulation is at least not always necessary to the production of œdema.

The theories which have been mentioned will give you an idea of the prodigious amount of scientific investigation that has been undertaken in an effort to understand and explain the causation of dropsy. We have learned much, there is still much to be learned, but the outlook is hopeful.

Clinically we encounter dropsy in large amounts in cardiac, cardiorenal, and renal diseases, in cirrhosis of the liver, from the pressure of tumors especially of the abdomen but also of the mediastinum, in the late stage of tuberculosis, and in some anæmias. Slight œdema may occur in a variety of diseases and especially in those in which there is malnutrition, impoverishment of blood, intoxication and neuritis. The cases I show you to-day belong to the common forms of disease of the heart, liver and kidneys.

Cardiac dropsy is the most frequent of all forms. W. Howship Dickinson says that in 300 cases which came to postmortem the heart was the cause of the dropsy in 163 cases, nearly twice as often as the kidneys. It will be recollected that the majority of our cases were cardiac.

Treatment of Cardiac Dropsy.—Cardiac dropsy occurs as a late symptom of failing heart power. There is probably always tricuspid insufficiency and usually mitral obstruction or insufficiency or both. Sometimes the insufficiency results from a valve lesion, sometimes it is a part of a dilatation of the heart, and the latter may be secondary to a valve lesion or the result of an acute toxæmia or some degenerative change in the heart muscle. Whatever its cause, dilatation of the heart is the anatomical condition which accompanies dropsy. It is more common following mitral disease, but then mitral lesions are very much more common than aortic. In advanced aortic disease with secondary dilatation of right and left hearts dropsy is often seen. One of our patients showed it markedly. Practically in such cases we are dealing with

mitral and tricuspid insufficiency and the essential feature is the dilatation which makes them possible. Many writers say that we should not give digitalis and drugs of similar action in aortic disease; but I believe a safer rule is to fix the attention upon the dilatation and the blood-pressure. If there is dilatation and low arterial pressure digitalis will do no harm and usually is of great benefit, no matter what the valve lesion may be.

Cardiac dropsy usually shows first about the ankles and then extends up the legs. The early and milder forms usually yield promptly to rest in bed. This relieves the heart of some of its strain and removes the bad influence of gravity upon the legs. In severe cases, cases of long standing and in recurrent cases much more than rest in bed will be needed, but rest is essential and in all but urgent cases it is well to try for a few days what rest alone will do. It will enable one to estimate the recuperative power of the heart and aid one in prognosis. The bowels should be opened by a calomel purge—calomel is preferable to other agents because it often acts upon the kidneys as well as upon the bowels, and it seems also to promote absorption of fluid exudates. The third measure of importance is to put the patient upon a milk diet. It is not essential that the milk should be fresh cow's milk; skim milk, buttermilk, or some one of the fermented milks may be preferable in certain cases. Milk sugar itself may be employed as a diuretic in doses of a teaspoonful in a glass of water three or four times daily.

In cases in which the dropsy does not disappear rapidly enough under the foregoing measures, one may resort to cardiac tonics, diuretics or purges or to combinations of such drugs.

Of the cardiac tonics the most efficient is digitalis in the form of a fresh infusion or the powder. Strophanthus and sparteine may be tried but I cannot recall a case in which they succeeded when digitalis had failed. The effect of digitalis is to slow the heart, increase its energy, contract the arteries and act as a diuretic. The result in a cardiac dropsy is often very striking and very happy. One can see a steady lessening in the dropsy as the heart diminishes in size and becomes slower and more regular.

Of the diuretics those most frequently employed are the salts of potassium,—the bitartrate, citrate and acetate,—and the drugs of the caffeine group. The bitartrate is rather the best of the saline

diuretics as it is laxative as well as diuretic. It may be given separately diluted freely with water or combined with the infusion of digitalis.

The caffeine group comprises caffeine itself, the sodio-salicylate of caffeine, theobromine sodium-salicylate (diuretin), theocine and theocine sodium-acetate.

These agents are slightly stimulant to the heart but owe their value to a direct action upon the renal epithelium. The least active is caffeine, the most active theocine and its double salt. All except caffeine should be used with caution when the kidneys are not sound.

J. Lipowski⁷ says that diuretin is a heart poison and while in some cases it acts well as a diuretic, the pulse becomes irregular and eventually the patient dies in collapse. He declares that in not a single case was the favorable effect lasting. However, he quotes in detail two cases in which diuretin acted better than other drugs. I have not employed it often enough to have any opinion as to its value. In one of our patients who had a moderate general dropsy due to a dilated heart following an alcoholic debauch, theocine sodium-acetate caused a marked increase in the excretion of the urine and the dropsy promptly disappeared. In a private patient the volume of urine under theocine increased from a pint to a gallon in twenty-four hours with rapid subsidence of a very extensive anasarca. It is especially valuable in cardiac dropsies where the kidneys are either sound or but slightly affected and that with parenchymatous change. I have never seen benefit follow its use in chronic interstitial nephritis. Digitalis often aids its action. It is a prompt diuretic, the maximum effect being reached usually on the second day of its administration. If no diuresis occurs after twenty-four hours the drug should be stopped. It is better even in favorable cases to stop its use after four to seven days, and then resume it if necessary in ten days or two weeks, when sometimes it will act nearly as well as at first.

Purges are not employed as frequently in cardiac as in renal dropsies. The best ones are calomel, one or two grains at bedtime; blue mass 10 grains at bedtime followed by a saline the following morning, and Epsom salt in concentrated form on an empty stomach.

Treatment of Cardiorenal Dropsies.—A good illustration of

this type of dropsy is furnished by the patient C. H., shown here. He is 63 years of age. His family history indicates a tendency to disease of the blood-vessels, as his mother and two brothers died of apoplexy. He has never used alcohol. He had smallpox when eight years old, pneumonia twice, when 23 and 27 years of age. One year ago he began to have shortness of breath, swelling of the feet and legs, palpitation and weakness. These symptoms recurred at intervals and were present on his admission to our wards. The arteries were somewhat tortuous and sclerosed. Both right and left hearts were dilated; the apex-beat was in the sixth interspace, anterior axillary line, but there were no murmurs. The jugular veins were distended and showed systolic pulsation.

Here was a man with a markedly dilated heart and without a valve lesion to explain it. What was the cause? Apparently it was some chronic process as the patient had had symptoms referable to it for at least a year. There were two possibilities. A chronic adhesive pericarditis without physical signs, or a chronic overstrain of the heart due to prolonged blood-pressure the result of arterial sclerosis and chronic nephritis. The latter was the diagnosis. At first the urine showed no albumin or casts, but later both were found.

As you see the patient to-day he shows general anasarca. Edema is pronounced in the legs and scrotum, and there is also considerable ascites with some edema of the lungs. Cardiac tonics and diuretics have had very little effect upon the dropsy. This would be a favorable case in which to employ Southey's or Curschmann's tubes. Fig. 1 shows you Curschmann's tubes. After sterilizing the skin of the legs and the tubes they are thrust in under the skin of each leg, the trochar removed, a long rubber tube attached to the distal end, and the metal tube held in place by a gauze and adhesive plaster dressing.* The rubber tube should be carried over the edge of the bed into a bottle or jar resting on the floor. Care should be taken to prevent compression or kinking of the tube by movements of the patient or by the bedding.

Following the hint of Schröder (quoted by Lipowski) that

* H. was so treated after leaving the clinic. During the first twenty-four hours 4 quarts and 23 ounces of serum were obtained. In the next twenty-four hours, 3½ pints. Not only the dropsy but the toxæmia also were greatly improved, so much so that the patient insisted upon leaving the hospital.

diuresis after the administration of caffeine sodium-salicylate was more prompt if chloral was given to animals at the same time, we gave C. H. six grains of the salt every four hours. The urine increased during the two following days to 124 and 116 ounces respectively. But it was not maintained and there was no permanent gain from its use; whereas it was noteworthy that following the withdrawal of fluid through the tubes not only was dropsy lessened but the somnolence and delirium due to uræmia also disappeared. This seems to indicate that the dropsical fluids may

FIG. 1.



Curschmann's tubes for withdrawing serum from the skin and subcutaneous tissues. *a*, tubes ready for insertion; *b*, the trochar portion of the tube, to be withdrawn after insertion; *c*, the portion of the tube to be left *in situ* in order to secure drainage.

contain poisons concerned in the production of uræmic symptoms.

Treatment of Renal Dropsies.—While heart disease is the most frequent cause of dropsy, disease of the kidneys results in the largest accumulations of dropsical fluid, especially in the serous sacs. The patient, A. J., is a good illustration of this type of dropsy. He is 22 years of age and a baker by trade, but it was developed by cross-questioning that he spent most of the day chopping ice and mixing it with salt to put around ice cream in the process of freezing it. Hence he was frequently wet and chilled.

He declared that he was perfectly well until a week before admission. But he subsequently admitted that he had had an attack similar to the present one eight years ago. On admission he had the same marked pallor and puffiness under the eyes and jaws as you now see. He had also a moderate general anasarca due to an acute nephritis. The urine contained considerable albumin, with blood and epithelial casts. There was some thickening of the arteries, accentuation of the aortic second sound, and displacement of the apex beat to the left. I believed therefore that the condition was not one of simple acute nephritis, but of an acute attack superimposed upon a chronic parenchymatous process. This judgment proved correct, for after the acute attack subsided the albumin persisted and the patient became uræmic.*

These cases are often discouraging because permanent cure is impossible. Great temporary improvement, however, is often attainable. Tyson speaks very highly of rest in bed and a diet of four ounces of skimmed milk every two hours in conjunction with one quarter to one-half grain of sparteine three times daily. Matthew Hay recommended the use of concentrated doses of Epsom salt and the withdrawal of other liquids. He gave 360 grains in half an ounce of water before breakfast. Sometimes a salt-free diet lessens the dropsy (Widal cure). As there is no way of telling in advance whether the salt is hurtful or not the suggestion of Blocker may be followed. He advises the administration of 10 Gm. of salt every day for a few days while the weight is watched. If the patient gain in weight a salt-free diet should be ordered.

The heart must be watched lest an acute dilatation occur and be an important factor in keeping up the dropsy. When there is much œdema of the legs the Curschmann or Southey tubes should be used. While hot packs are more helpful in relieving the patient of uræmic symptoms than of his dropsy they occasionally help and may be tried. When other measures fail I try elaterium and compound jalap powder. Elaterium may be given as advised by Sewell in doses of $\frac{3}{32}$ of a grain every hour for two or three successive days until nausea is produced.

Compound jalap powder should be given to adults in doses

* He died subsequently and the autopsy showed the large white kidney of chronic parenchymatous nephritis.

of thirty to sixty grains once or twice a day. The stools produced by these agents are watery and sometimes considerable prostration results.

Treatment of the Dropsy of Liver Cirrhosis.—The patient, J. R., will be used to illustrate this type although he shows chronic parenchymatous nephritis and cirrhosis of the liver. He is about 35 years old. He lately has drunk gin but formerly used to drink whisky and beer. It was his habit to get drunk regularly once a week. Seven months prior to admission he began to have cramps in the hands and soles of the feet. Subsequently the ankles began to swell, and later the scrotum, penis and abdomen. The urine contained a moderate amount of albumin and hyalogramgranular casts.

Occasionally there were blood and epithelial casts. As you see there is the puffy, pallid face of chronic nephritis and some œdema of the legs, but compared with the œdema elsewhere a relatively large ascites. The ascites has persisted when œdema has disappeared from other places. The abdomen has been tapped on several occasions and large quantities of fluid withdrawn with great relief to the patient. After one tapping the fluid oozed from the wound for days. But each time the fluid reaccumulates. The Talma operation has been performed in similar cases, but the results are not encouraging. For the average case tapping is to be preferred to operation.

As a diuretic in ascites from cirrhosis of the liver calomel at times achieves brilliant results and at times fails utterly. It should always be tried. The dose is one or two grains daily at bedtime, for several days in succession. Iodide of potassium is also occasionally of service.

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THE DIAGNOSIS OF CHRONIC PANCREATITIS*

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WHEN your Chairman was good enough to ask me to address you this evening, he requested me to select a subject which would appeal to the general practitioner. I am fully aware that a society like yours, composed of men engaged in general practice, can care little for a technical paper on a surgical subject, and, therefore, I have chosen for the topic of my address the Diagnosis of Chronic Pancreatitis, because, although now a strictly surgical disease, the patients are first seen by the medical man and I have found that the profession, as a whole, is not thoroughly alive to the diagnosis of this extremely interesting affection. I shall, consequently, confine my remarks exclusively to the question of the diagnosis, which I trust will pave the way for early recognition of the condition and its proper surgical treatment.

Chronic pancreatitides may be divided into three groups, namely, (1) chronic interlobular interstitial pancreatitis; (2) chronic interacinous interstitial pancreatitis; and (3) pancreatic cirrhosis. In the first type, the normal connective tissue, placed between the lobules of the gland, is transformed into a dense sclerous tissue extending around the excretory ducts and their envelopes, thus dissociating the lobules. In the second variety there is a new-formed, irregular and diffuse fibrous tissue separating the glandular acini and occasionally penetrating between the individual cells, but in this type the interlobular connective tissue has undergone little change.

Pancreatic cirrhosis is the final stage of the two preceding types, but it may be said that it is more apt to follow the interlobular form. In the latter, glycosuria is rarely encountered and the lesions must be very advanced with an almost complete de-

* Address delivered before the Wellesley Medical Club, Wellesley, Mass., January 20, 1910.

struction of the glandular acini and a very marked involvement of the circulation of the islands of Langerhans. The same cannot be said of the interacinous type. Here, the islands are involved at an early date in the process, diabetes appears early and may result in death before cirrhosis has become marked.

Before speaking of the principal symptoms of the chronic pancreatitides, particularly those dependent upon a cholelithiasis, I would first refer to the premonitory symptoms. Whether or not they develop insidiously or follow a more or less marked attack of acute pancreatitis, the chronic pancreatitides are usually preceded by certain prodromes. At this stage of the disease gastrointestinal or biliary disturbances exist, either singly or combined, such as a sensation of weight in the epigastrium, pain in the right hypochondrium, decrease of the appetite, dyspeptic disturbances, and later on a more or less marked jaundice. Progressively these symptoms become more marked, and soon become completed and the disease reaches its full stage of development. When this has occurred we must take into consideration the following symptoms: tumor, pain, icterus, loss of flesh, hemorrhagic tendency; and then the examination of the urine and feces. Other symptoms, due to the condition of the gall-bladder, such as dyspeptic disturbances, and the characters of the pulse and temperature chart, are extremely variable and possess only a secondary value.

Considering now the pancreatic tumor, it should be pointed out that a physical examination of the pancreas is a difficult matter when one considers its deep-seated location within the abdomen, the many viscera situated in front of it, and the frequent rigidity of the recti due to pain in the organ. From inspection little is to be gained and I am aware of no case where an appreciable tumefaction could be noticed. On the contrary palpation may give some useful information. It should be methodically carried out: above in a horizontal line passing through the anterior ends of the eighth ribs; below, two finger-breadths above the umbilicus; to the right, two finger-breadths from the median line; and to the left, two centimetres within a line drawn through the left nipple.

In some cases a healthy pancreas has been palpated, and one should not conclude from this that the organ has undergone a

pathologic change, because it merely shows how greatly palpation may facilitate the diagnosis when the organ is increased in size. Palpation will allow one to detect the seat, the form, the volume, the consistency, and the condition of mobility of the tumor felt.

Preliminary rules must be observed in order to obtain all the data that this method of examination may give. Numerous writers advise completely emptying the stomach and intestine before palpation is carried out, and this is only logical. The position given to the patient is of considerable importance; the abdominal muscles must be relaxed to the greatest possible extent, with the knees drawn up and flexed on the pelvis. The patient should be instructed to breathe regularly while the palpating hand examines the organ from its head to its tail, depressing the abdominal walls progressively, never suddenly. If necessary, narcosis may be resorted to, because the rigidity of the recti may interfere and, at the same time, one can more easily ascertain if the neighboring viscera are also involved.

With the patient under the influence of an anæsthetic, one can readily detect the changes which have taken place in the head of the pancreas, this being the most common seat of the inflammatory process. The tumor here may be extremely hard, sometimes attaining the size of a closed fist. The induration is usually immovable and does not become displaced with the movements of respiration. In some cases the tumor will be felt in the epigastric region, while in others, it may be found under the liver. I am here referring to what is most ordinarily felt, but in some instances palpation reveals a less distinct condition of affairs. For example, an indistinct induration has been felt in the region of the head of the pancreas, while in other cases, only a localized resistance could be detected in the epigastrium.

In some instances the head of the organ has been so greatly increased in size that it compressed the aorta against the spinal column, so that palpation revealed the existence of pulsation synchronous with the pulse, but far more frequent are those instances in which palpation was without result and numerous are the observations in which no tumor or increase in size of the organ could be detected.

Palpation will also reveal the presence of pain and the loca-

tion of its maximum intensity. Further on I shall consider more carefully pain as met with in the chronic pancreatitides and I will only mention here the more or less marked pain accompanying the pancreatic tumor which may be detected by palpation. In some cases the induration will be found painful on pressure, while in others it may not be marked. Beside the condition of the pancreas revealed it should be recalled that palpation may also furnish very useful indications relative to other abdominal organs. It will reveal an increase in the size of the liver, also the consistency and sensitiveness of this organ on pressure, likewise the surface, whether smooth or not.

Percussion, unfortunately, is of little value in making the diagnosis of chronic pancreatitis, but in some few cases dulness over the tumor has been distinctly present. This diagnostic means will, however, aid one in ascertaining the condition of the liver, gall-bladder, etc., likewise the presence or absence of ascites, and will indicate the relationship of the tumor with the neighboring sonorous organs, principally the stomach. By producing distention of the latter, percussion will indicate whether or not the tumor is behind the stomach. Resonance on percussion when the stomach is distended, or a communicated non-expansive pulsation with a very slight movement during deep inspiration may be considered characteristic of pancreatic tumors.

To sum up, it may be said that, at the commencement of the disease, the tumor will be perceived with considerable difficulty on account of its deep-seated location and its small size, but later on, when the patient has lost flesh, it may be frequently detected. It is usually seated from four to five centimeters above the umbilicus in the median line, or slightly to the right. The resistance felt by the exploring hand in the large majority of cases, is that of renitence, or of something hard, rounded and rather badly defined. And lastly, the retrogastric location of such a tumor, recognized by percussion after distention of the stomach will allow one to diagnose it.

In the history of patients afflicted with chronic pancreatitis, and particularly in those where the affection is combined with biliary lithiasis, one generally finds that attacks of pain have occurred in the right hypochondrium and epigastrium. These at-

tacks are associated with icterus and sometimes fever of an intermittent type, quite similar to malaria. Tenderness in the epigastrium has been noted and if the pancreatic symptoms predominate, the pain will pass from the epigastrium to the left with radiations to the lumbar and interscapular regions. When the chronic pancreatitis is not due to a cholelithiasis, there may be only a certain malaise in the epigastrium, or else the patient may complain of an indefinite pain, while in some cases, the symptoms undergo their evolution without any pain, there being only dyspepsia, which is soon followed by a mild degree of icterus.

The *maximum point* of pain has been hardly heeded by the majority of writers. Mayo-Robson refers particularly to epigastric pain occurring in paroxysms, with or without vomiting. Other authors have found the pain above and to the right of the umbilicus, while in still other instances, it was in the hepatic region two or three finger-breadths below the false ribs. This pain, which has almost always been noted, has been considered as an important diagnostic element. Without doubt it has a certain amount of value from this standpoint, but sufficiently distinct characters should be given it in order to show that it has no other origin than that of the pancreas. Working on these lines, Chauffard has demonstrated that the so-called pancreatic point is not infallible from a diagnostic standpoint and he proposes what he calls the "pancreaticocholedochus zone" which is more in accord with clinical facts. This zone is the space corresponding to the head of the pancreas which the ductus choledochus passes through or crosses over. In order to map it out all that is necessary is to draw a vertical line starting from the umbilicus and a horizontal line forming a right angle with the former and then to trace a bisecting line. The pancreaticocholedochus zone will be included between the vertical line and the bisecting line of the angle without exceeding above the height of five centimetres on the bisecting line and below not quite to the umbilicus. Thus it will be seen that this zone is located further down and more inwardly than the gall-bladder point, which corresponds externally to the end of the cartilage of the tenth right rib. A line which will unite both regions will quite exactly correspond to the route followed by the choledochus. Thus, when this zone is mapped out one

may quite easily distinguish the so-called pyloric point and the appendicular point, the latter being located lower down and more outwardly.

The maximum point of pain having been thus methodically sought for by pressure over the pancreaticocholedochus zone, its value will, nevertheless, be uncertain in some cases. For example, in a case of stone lodged in the choledochus with chronic pancreatitis, to which of these lesions should the pain be attributed? It is certainly very difficult to surmise the respective part played by each, but a calculus in the choledochus once removed and the resulting fistula closed, the localized pain on pressure still existing becomes most significant and thus may give excellent diagnostic data.

The special yellowish discoloration of the integument and mucosa, due to the presence of the coloring matter of the bile in the blood-plasma and tissues constitute icterus. This symptom is found so constantly that it has been considered as one of the principal signs of chronic pancreatitis. However, there is a question whether or not it belongs strictly speaking to this affection. May it not possibly be an added element, complicating at a given time the evolution of the disease and merely indicating the presence of a new disturbance arising in the excretory ducts of the bile? The problem is most complicated and, in point of fact, it is a difficult matter to attribute to the true cause icterus arising in chronic pancreatitides.

Although in some recorded cases the statement is made that icterus was absent, this nevertheless must be most exceptional. It is the anatomical relationship between the head of the pancreas and the choledochus, as well as in the way of ending of this duct and of Wirsung's duct in Vater's ampulla that the principal causes of icterus must be looked for. Five different types of formation of Vater's ampulla have been described, likewise the terminal end of the pancreatic duct and the choledochus. These differences are those which govern the production of the lesions and those of icterus in chronic inflammation of the pancreas. If there is a calculous obstruction of the choledochus, the jaundice is often very marked, but, in these cases, a mechanical obstruction is not the only factor, because the size of the calculus is frequently insufficient

to obstruct the lumen of the duct completely, and consequently there must be another element in play and this element is an inflammation of the mucosa having an infectious origin, and the swelling resulting therefrom adds to the obstruction of the canal.

When the choledochus produces a depression in or passes through the head of the pancreas, a condition which is found in about 62 per cent. of the cases, the latter, increased in size by the chronic inflammatory process, may compress the duct with ease and a very marked icterus is often the result, but here again, a large part should be attributed to infection. In certain cases the icterus may be due to two factors following upon each other. For example, a calculus may pass down the choledochus when it is surrounded by the head of the pancreas, setting up compression, followed by inflammatory changes, and the latter, in their turn, may give rise to compression of the duct from which arises an icterus that may remain a long time after the calculus has been expelled.

Attacks of angiocholitis, which are frequent in the history of cases of chronic pancreatitis, probably also have a great deal to do with the production of icterus, while the infectious agents may also act directly in giving rise to jaundice.

From what has been said one may easily surmise the difficulties encountered when an endeavor is made to connect the icterus with a chronic pancreatitis and I shall now rapidly point out the characters peculiar to this form and, in order to do this, we must first consider the intensity, and, afterwards, the evolution of the jaundice. At present, we know that the icterus varies from a slight yellow tint to an intensely deep mahogany one with all possible intermediaries. If the jaundice is not always present, it certainly is frequently encountered, at least in the early stages of the disease, and when once it has become evident it undergoes the influences of these various etiologic factors in its evolution. I believe that it may be accepted as a generality that when the icterus is due to cholelithiasis, and especially when a stone is lodged in the choledochus, it is more distinct and of longer duration, while when arising from a pancreatitis, it is less pronounced and undergoes greater variations in intensity. However, the jaundice is often very pronounced when the choledochus passing through or producing a furrow in the pancreatic head is compressed by the en-

larged gland. An attack of angiocholitis or an inflammation of the choledochus may also appear and will add its effect to the mechanical occlusion of the biliary tract and thus the icterus will be all the more increased. To sum up, it would seem that one should not give too great a value from the diagnostic viewpoint to such a variable symptom as is icterus, and, although it is one of the most frequent symptoms met with during a chronic pancreatitis and should draw the physician's attention to the possible existence of this lesion, it nevertheless possesses only a secondary diagnostic value on account of its varying pathogenesis. It does not belong particularly to chronic pancreatitides and is merely an element indicating the existence of a disturbance in the biliary tract.

One of the most remarkable symptoms of chronic pancreatitis is loss of flesh, and this usually occurs with great rapidity, the patient not infrequently losing from five to ten pounds in a month, sometimes even more. From this results a very marked emaciation, then a very marked loss of strength occurs, and the patients often come to the surgeon in a state of advanced cachexia. But the loss of flesh is not due to one cause alone, because several factors come into play in its production. The anorexia, digestive disturbances, a defective intestinal digestion, disturbances of the assimilation, resulting from the retention of the pancreatic juice and bile are all factors which add their combined action.

For some time past the part played by the diminution of the secretion of the pancreatic juice has been pointed out and it is probable that a disturbance of the internal metabolism also plays an appreciable part in the production of the emaciation, as is shown by certain characters of the urine which I shall refer to later on.

If in certain cases of chronic icterus due to lithiasis of long standing marked loss of flesh has been met with it would, however, seem that this is rather more due to the presence of a chronic pancreatitis and gives it its particular clinical picture. Consequently, one should consider such a rapid denutrition very important evidence from the diagnostic standpoint. Taken alone, the loss of flesh does not justify the diagnosis, but when combined with other symptoms, and particularly when fat and muscular fibres are found in the fæces and pancreatic crystals in the urine, undoubtedly

it is one of the most important symptoms in chronic pancreatitides due to cholelithiasis.

Without wishing to consider here the local hemorrhages arising in the pancreatic parenchyma, it is nevertheless necessary to refer to the tendency of the production of general hemorrhages in chronic pancreatitis. This tendency is occasionally very marked when the affection has reached its full stage of development and it increases still more at its terminal period. At this stage, cutaneous hemorrhages, hæmoptysis and hemorrhages into the cellular tissue and mucosa are frequent and increase the patient's already weakened condition.

Not infrequently hemorrhage has been the cause of considerable trouble during surgical interference or immediately afterwards, and this should be always recalled and guarded against by suitable therapeutic measures.

This tendency towards hemorrhage has only a secondary importance from the diagnostic standpoint, because it occurs in various forms of hepatic lesions, where it has a particularly serious prognosis. It may produce a pronounced state of anæmia, which occasionally takes on the pernicious form.

Blood-examination shows a more or less marked diminution of the red cells with a notable decrease in the amount of hæmoglobin. As to the leucocytic formula, it is only slightly or not at all changed.

Much discussion has arisen as to the origin of the hemorrhagic tendency, but it is probably due to lesions of the liver. It has also been attributed to a decrease in the albumins of the serum, and consequently, the blood becoming more fluid, may escape easily by the slightest exit given it. The results obtained by the delay in blood coagulation should be accepted with reserve, as causes of mistake are most numerous. I would merely mention the decrease of lime salts in the blood and the marked elimination of these salts in the urine in the form of oxalate in almost all cases of chronic pancreatitis and to this the tendency to hemorrhages has been attributed by Mayo-Robson. However this may be, it has been noted that the administration of chloride of calcium has effectively controlled this condition, both before and after surgical interference.

The urine presents important changes during the evolution of

chronic pancreatitides and in many cases the analysis has been alone sufficient to make the diagnosis. In color it is more or less dark, according to the amount of bile pigments that it contains and the hue will also vary with the intensity of the icterus.

The total twenty-four hour amount varies. Often it is first diminished in quantity, but when the period of pancreatic insufficiency has been reached the total amount will be decidedly above the normal. It may reach several litres in twenty-four hours and will then contain sugar, sometimes albumin, while the amount of nitrogen is greatly increased. Before this period has arrived, usually neither sugar nor albumin can be detected.

The question of glycosuria occurring during diseases of the pancreas brings up that of the internal secretion of this gland and those structures whose function it is to elaborate it. Opie has shown that this internal secretion, which regulates the metabolism of the carbohydrates, arises in the islands of Langerhans, and when these are the seat of a pathologic lesion glycosuria is produced. The experiments of Von Mering and Minkowski have shown that glycosuria does not occur in animals, if only a portion of the pancreas has been removed and, as far back as 1877, Lancereaux showed that the total removal of the pancreas produced diabetes. The experiments of Thiroloix have shown that only the most minute quantity of pancreatic parenchyma is necessary in order to regulate the proper carrying out of the glycogenic functions. Minkowski, experimenting on dogs in which a portion of the pancreas had been injured, noted that glycosuria appeared when the amount of sugar taken with the food was increased, and was absent when the animals were submitted to an ordinary diabetic diet. The condition which results is what is called alimentary glycosuria and it is quite marked in patients whose pancreas is diseased. The presence of glucose in the urine is encountered only in advanced cases of chronic pancreatitis, and its absence when other symptoms of this affection exist only shows that these cases are at a less advanced stage and may be benefited by treatment. When a chronic pancreatitis has reached its period of full development, one should carefully ascertain the condition of the internal secretion of the pancreas by giving the patient 150 Gm. of glucose after which the amount of sugar in the urine collected at regular intervals is ascertained.

Alimentary glycosuria will thus indicate that there is an in-

vovement of the islands of Langerhans, but I am of the opinion that its value is only relative. It has been pointed out by Linsier and Roque that this glycosuria is compatible with health, and is present in a number of pathologic conditions, particularly in obliteration of the portal vein and in changes of the hepatic cell. For that matter, one should investigate the renal permeability as well as disturbances in intestinal absorption by the ingestion of 0.05 Gm. of methylene blue, which is afterwards looked for in the urine.

The presence of other sugars in the urine in cases of chronic pancreatitis has been mentioned, but maltosuria and pentosuria are quite exceptional. Mayo-Robson met with lipuria in a female patient 44 years of age; she was operated on and her pancreas found increased in size. There were no biliary calculi. The infrequency of this symptom gives it no diagnostic value, and for that matter lipuria has been encountered in other conditions, while in the pregnant female it may be the result of a régime too rich in fats.

As to indican, it is well known that it is to be found in large amounts in all cases where intestinal fermentation is present.

Particular mention should be made of excessive excretion of lime salts in the urine in the form of oxalate crystals. It is present in almost all cases and may to a certain extent explain the production of hemorrhages. Generally, when the urine contains bile, the crystals are not observed under the microscope because the bile takes up all the calcium salts. On the other hand, when the icterus has been decreased from surgical interference examination of the urine will show the presence of the oxalates as long as the pancreatic disturbance persists. In passing, I would merely mention the urinary toxicity, for it is well known that icteric urine is more toxic than in the normal state of health. And, finally, before considering the question of the pancreatic reaction of the urine, which has been so greatly discussed, I would briefly refer to the Sahli-Nencki test, which allows one to make a valuation of the condition of the external pancreatic secretion. This test consists in giving by mouth one gramme of salol and afterwards searching for salycilic acid in the urine, which is due to the splitting of the salol in the intestine. At present little value is given to this test, because it is subject to numerous causes of error.

In March, 1904, Cammidge published his results of urine analysis in cases of pancreatic disease. This test, which has been very greatly discussed is, however, both complicated and delicate and it is hardly in the province of this address to give its technic, so I will merely allude to it, and those desirous of having a detailed account are referred to the second original article, which was published in the *British Medical Journal*, May 19, 1906. Be it said, however, that with all the criticisms of an adverse nature that have been made to this method, it is in my opinion absolutely reliable from a diagnostic standpoint when carried out by one well versed in laboratory technic.

I will now consider the characters presented by the fæces in chronic pancreatitides and shall somewhat lengthily insist upon them, because, at the present time, their examination is of considerable importance from a diagnostic standpoint. In chronic pancreatitis, particularly, the fæces undergo very important changes; they are increased in quantity and frequency. They are increased in volume, because they are soft and not fluid. This condition of softness has been remarked in many cases. The color is not normal; they are slightly colored, sometimes being white or clay-colored. This loss of color usually follows a parallel progress with that of icterus, but probably is not always due to the absence of bile pigment, but to an excess of fat. A marked fætor is also characteristic and is due to the abnormal fermentation going on in the intestine, but considered by itself it has not much more value than the loss of color. Both are encountered in the majority of cases of icterus and, on the other hand, we know the frequency of jaundice in chronic pancreatitides.

On the other hand, the presence of fat in the stools is of great importance, although it must not be considered pathognomonic. The steatorrhœa, which should always be looked for, causes the stools to look fatty or oily; and when the fæces are placed in water, the fat comes to the surface and solidifies there like lard. It becomes liquefied at a moderate heat, it is very combustible, burning with a bright blue flame. In other cases the stools take on the form of little rounded whitish masses, which feel unctuous. The surface of the fæces is covered with numerous drops of fat or a greasy covering. The steatorrhœa may appear and disappear at certain times. When there is any doubt as to the presence of

fat in the stools, there is an easy procedure for its detection, which consists in mixing the superficial layer of the *fæces* with ether and then inserting a piece of blotting paper into the liquid after filtration. If there is fat the paper, after evaporation of the ether, becomes translucent. The *steatorrhœa* is an indication of the marked disturbance in the digestion of fatty bodies which exists in chronic pancreatitis. It varies with the diet, and, when fat is taken in large quantities, it becomes more marked. On the other hand it has been met with when there is no lesion of the pancreas, when the subject has consumed a large quantity of fatty food, but, nevertheless, it is a diagnostic sign of great value. It is also interesting to know that the fats eliminated by the stools are not always in the form of fat, but may be eliminated as saponified fats and fatty acids, combined or free. One should ascertain the proportion of each contained in the *fæces*, and this brings me to speak of the chemical semeiology of the *fæces*, because the diagnosis of diseases of the pancreas, and particularly of chronic pancreatitis, owes much from the diagnostic standpoint to this examination.

In order to attain the best results from chemical analysis of the *fæces*, the same method should always be followed. In the first place, the patients should be placed on a diet all of whose ingredients are exactly known. The test meal intended to put in evidence the special activity of the digestive glands has been worked out by Gaultier of Paris. The meal is composed of 100 Gm. of white bread, 60 Gm. of beef, 20-30 Gm. of butter, 300-500 Gm. of milk, and 100 Gm. of potato. This meal corresponds to the digestive capacity of the intestine of a normal man and its composition is such that, when digestion is perfect, it is with difficulty that the ingested foods can be found in the form in which they have been taken.

In order to control the fecal residue as exactly as possible it is necessary to stain it by the use of powdered carmin, which can be given in cachets at the beginning, in the middle of, or the end of the meal. It should be also pointed out that the test meal should be taken when the patient arises in the morning and that his supper should be most frugal and taken at about six o'clock on the previous evening.

In patients the possessors of some hepatic affection, the *fæces* will be observed as follows, when there is an absence or only

diminution of the amount of bile in the intestine: (1) The time of the digestive onflow is prolonged, and this occurs in variable proportions with this diminution. (2) The relationship of the weight of the dried fæces with that of fresh fæces is changed; there is a decrease in the quantity of water with an increase in the weight of the dried substances. (3) The reaction of the fæces is acid. (4) The quantity of fat contained in the test meal is much less utilized and, in point of fact, more than one-third of the total amount ingested is excreted, this taking place abnormally, because there is more than 50 per cent. of neutral fats in relation to the split fats, fatty acids, and soaps. (5) The carbohydrates, on the other hand, do not undergo any change in their normal utilization. (6) The albuminoids excreted are increased to from 13 to 17 per cent., expressed in the total nitrogen; with a test meal logically composed, albumin and the albumoses are not found and the process of secondary digestion of Schmidt remains negative. (7) And, lastly, there is a more or less marked decoloration of the matters, due to a decrease of the biliary pigments, which may be detected by Gmelin's reagent.

On the other hand, the absence of the pancreatic juice in the intestine is made manifest in the following way in patients the possessors of pancreatic disease: (1) The duration of the digestive onflow is shorter than normal. (2) There is a decrease in the quantity of water contained in the fæces and an increase in the weight of the dry substances. (3) Their reaction is neutral or alkaline on account of the undigested albuminoids which have undergone putrefaction. (4) With a test meal, the quantity of fat in the fæces is considerably increased, more than 60 per cent. of the ingested fats not being utilized, and, among these excreted fats, more than 75 per cent. are neutral fats, which have not been split up. (5) The carbohydrates, on the other hand, are fairly well utilized and the fermentation test will hardly give rise to the formation of any gas. (6) The total nitrogen is increased in the proportion of from 26 to 33 per cent., while neither albumin nor albumoses are to be found, and Schmidt's test of secondary digestion remains negative.

The above test meal and the analytical results obtained have a most important bearing on the diagnosis of chronic pancreatitis and should always be resorted to in order to complete the diagnosis.

I have insisted somewhat on the question of steatorrhœa and on the condition of the utilization of the fats, because their diagnostic value is certain, and, in closing this address, I would like to say a few words relative to azotorrhœa.

By this designation is meant the presence in the stools of undigested nitrogenous food, such as muscle fibres. They are to be detected with the microscope, but, when alone present, without any other abnormal condition of the fœces, they cannot be considered of any diagnostic value as far as diseases of the pancreas are concerned. If they are present in combination with steatorrhœa, pancreatic disease may be suspected. If the azotorrhœa and steatorrhœa are combined with diabetes or the presence of a tumor in the epigastrium, pancreatic disease is extremely probable. And, lastly, if the azotorrhœa and steatorrhœa are present at the same time as there is a pancreatic reaction in the urine, a disease of the pancreas is practically certain.

In conclusion, I would sum up the question as follows: When a chronic pancreatitis has reached the stage of its full development, and particularly, when it is dependent upon a biliary lithiasis, the symptoms may be divided into two groups, namely, (1) pain, icterus, and a tendency to hemorrhages; (2) in this group, which is the more important, we have the presence of a tumor, emaciation and the clinical evidences which may be found in an analysis of the urine and fœces.

Pain is very frequent, but not constant. The maximum point of pain should be ascertained by Chauffard's method. Icterus is one of the most constant symptoms, but it only indicates that there is a disturbance in the biliary tract. The tendency to hemorrhage, in all probability, is due to lesions of the liver which bring about marked changes in the blood. It should be looked for, but taken by itself it has no diagnostic value.

To make an absolute diagnosis of chronic pancreatitis there must be a tumor or a tumefaction of the organ, which may be very frequently detected by a careful palpation, rapid and extreme emaciation, particularly in pancreatitides due to cholelithiasis, and the data obtained relative to the functional condition of the pancreas by an examination of the urine and fœces, and by the improved technic of Cammidge for the detection of pancreatic crystals in the urine.

Medicine

THE LOCAL EFFECTS OF GALL-BLADDER INFECTIONS AND GALL-STONES UPON THE DIGESTIVE TRACT AND LIVER

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INFECTION of the gall-bladder may be either acute or chronic and may be associated with the presence of gall-stones. Acute infection of the gall-bladder may be due to the colon or typhoid bacillus or to the pneumococcus, streptococcus or staphylococcus. Acute cholecystitis may be associated with suppuration and the resulting empyema of the gall-bladder or with gangrene. Acute cholecystitis without gall-stones is a painful affection. The pain is usually referred to the gall-bladder region and epigastrium, and sometimes to the right scapular region. There is marked rigidity of abdominal muscles and acute tenderness of the abdomen, more marked in the region of the gall-bladder. Nausea, vomiting and great prostration are usually present. With the establishment of gangrene, as with gangrene of the appendix vermiformis, there may be a diminution of the local pain and tenderness and a lessening of the severe general symptoms. As in gangrenous appendicitis the condition is a dangerous one and doubly so because of the apparent cessation of the disease. Cholelithiasis with acute cholecystitis does not differ materially from cholecystitis without gall-stones with the exception that there may be a more marked pain from biliary colic, and perforation may occur more readily because of the presence of stone.

In acute cholecystitis with suppuration or gangrene the gall-bladder may rupture and general septic peritonitis occur; or formation of adhesions may result in a circumscribed abscess which may exist for a considerable period of time. In one patient seen

by the writer, the abscess filled the upper right quadrant of the abdomen, was thoroughly walled off from the general peritoneal cavity, and contained not less than a litre (1 quart) of pus. Such an abscess may rupture through the abdominal wall or may burrow in various directions and open in the lumbar region of the back, or may go downward along the posterior abdominal cavity and the psoas muscle to a point in Scarpa's triangle or passing upward under the liver to the diaphragm may rupture into the pleural cavity, working through the lung may finally rupture into the stomach or the intestinal tract. Phlegmonous cholecystitis or cholangitis may result in single or multiple abscess of the liver.

With the formation of adhesions between the gall-bladder and stomach, or duodenum or colon, the gall-bladder may rupture directly into the gastro-intestinal tract, into which it may discharge its contents. Spontaneous cure of cholelithiasis may result in this way.

Chronic cholecystitis with or without gall-stones is usually associated with repeated attacks of increased infection manifested by more or less pain in the gall-bladder region and referred to the epigastrium and often to the right scapular region. Gall-stones are usually present. Attacks of infection with colic may last for a variable time, from a few hours to several days. The pain may be very severe or may be mild. There is usually associated with it nausea, vomiting and more or less general disturbance including sometimes a considerable fever. Jaundice is not present unless the cystic duct has become dilated from the presence of stone and in consequence presses upon the hepatic duct, causing obstruction. Some patients suffer from almost continuous pain or a sense of dull aching in the right upper belly but usually there may be one or more attacks of biliary colic. Chronic cholecystitis is usually associated with a thickening of the gall-bladder wall and contraction of that organ. In a few instances with obstruction of the cystic duct due to the continued infection or to impacted gall-stones, the gall-bladder may become distended with a mucus-like fluid and present itself as a pyriform tumor. Cystic cholelithiasis without recognizable infection may exist indefinitely without subjective symptoms.

With the passage of stone into the common duct the biliary colic

becomes more severe than that due to the presence of stone in the gall-bladder or cystic duct. This increased pain is probably due to the greater tension and stretching in the gall-bladder and ducts above the obstruction. Vomiting, chills, fever, and profuse sweating, with great depression of the circulatory apparatus are usually present. The severity of pain and marked depression may result in death. The gall-stone may lodge in the ampulla of Vater and produce the well-known condition described by Fenger as "ball-valve stone." This consists of a condition of almost continuous jaundice but with periods of an increase in the amount of bile thrown into the general circulation associated usually with chills, fever, and sweating lasting for a day or a few days, to be followed by a partial or complete cessation of all of the symptoms for a variable period. There may be pain with the paroxysm, with chills, fever, sweating, and increased jaundice, or pain may be absent. With the passage of a stone into the intestine there may be entire relief of all of the symptoms and if it be a single stone spontaneous and permanent cure may result. A large gall-stone escaping from the gall-bladder through the gall-duct or by ulceration into the stomach or intestine may result in intestinal obstruction. Following cholecystitis, whether acute or chronic, calcification and atrophy of the gall-bladder may occur. Cholecystitis is usually associated with more or less localized peritonitis and resulting adhesions of the organ to the surrounding structures, including the liver, the stomach, the duodenum, and the transverse colon. Such adhesions also follow surgical operations upon the gall-tracts. Usually these adhesions are not dense enough to interfere in any way with the functions of the organ involved. In some instances, however, the adhesions may be so dense as to interfere especially with the motility of the stomach. This is more likely to occur when acute cholecystitis with empyema and resulting localized abscess leaves very dense scar tissue behind.

Infection of the common bile duct, usually with the presence of stone, may result, as has been shown by Opie, in infection of the pancreas through the pancreatic duct. Either acute or chronic pancreatitis may result. Chronic pancreatitis is far more common than the acute form and rare instances may result in such involvement of the whole pancreas, including the islands of Langerhans, that diabetes mellitus develops.

In acute cholecystitis, with or without gall-stones, the liver may be moderately enlarged, and if palpable is usually tender. As stated above, abscess of the liver may result from a phlegmonous cholecystitis. Chronic cholecystitis is usually associated sooner or later with slight enlargement of the liver and rather marked tenderness of the organ. When the hepatic or common duct is obstructed through infection or through gall-stone, distention of the liver from accumulated bile results. If this condition is permitted to continue biliary cirrhosis occurs. Long standing chronic cholangitis is a serious condition associated, as described above, with periods of chills, fever, sweating, depression, and jaundice. This has been called hepatic intermittent fever, and before the period of the modern surgical relief of such conditions by drainage of the gall-tracts, resulted in death. Cholecystitis with or without gall-stones, and especially when associated with biliary colic, often results in dynamic ileus. The condition is associated with nausea and vomiting, great distention of the abdomen, marked abdominal rigidity, tympanites, and constipation. The condition is most like that produced by a rupture of any of the hollow viscera with septic peritonitis.

FUNCTIONAL DISTURBANCES.—During attacks of acute cholecystitis or biliary colic there is usually nausea and vomiting. Between attacks of biliary colic the patient frequently complains of subjective disturbances of the stomach. There may be a sense of fulness and weight and more or less tendency to the eructation of gas after eating. This may be immediate, or only after two or three hours. Sometimes there is pain from one to two or three hours after eating, and sometimes there is pain immediately after eating, especially if the patient take coarse food or a full meal. The pain is usually of an aching, dragging character and may be referred to the epigastrium and sometimes to the right shoulder. Such disturbances of digestion may be continuous, but are more likely to occur at periods. Some patients are relieved by induced vomiting. Occasionally spontaneous vomiting occurs with relief, and occasionally some simple remedies, especially a carminative, seems to relieve the symptoms.

THE SECRETIONS OF THE STOMACH IN GALL-BLADDER DISEASE.—I have made an analysis of the conditions in sixty cases

of cholelithiasis to ascertain the secretions and motility of the stomach in this class of patients. These sixty patients have been selected out of three hundred and thirty-five patients of whom I have histories because in these sixty careful observations of the digestive power of the stomach were made. Fifty of them suffered from cholelithiasis with cholecystitis, and ten suffered from cholecystitis with cholelithiasis of the gall-bladder and the common duct.

The great majority of these patients presented practically a normal gastric juice. In a few instances the total acidity was high. In one 122; in two 112; in one 116. In a few the total acidity was low, practically an anacidity with no more total acidity than would be expressed by the acid phosphates of a test meal. Of these one showed a total acidity of 9 and two of 10. All of the remainder showed an acidity within normal limits. A hyperchlorhydria as represented by a large amount of free HCl occurred in only a few. The record shows free HCl in one of 70; another 78, and two 88.

Motility was disturbed in forty-five of the sixty patients during acute exacerbations of the disease, as shown by vomiting. A study of the motility of the stomach during intervals between paroxysms showed that there was practically never an anatomic insufficiency of the gastric muscle. The fasting stomach of the morning was invariably empty in every patient studied. In two patients the fasting stomach of the morning showed the presence of gastric juice without microscopic food remnants. In the same two patients a seven-hour motor meal showed the presence of gastric juice of a rather high acidity with a few food remnants. The remainder of the patients showed an entirely empty stomach with a seven-hour motor meal. The stools of these sixty patients showed an absence of chemical blood with two exceptions.

The analyses of the stomach condition of these sixty patients would seem to indicate that the digestive power of the stomach was not disturbed by cholecystitis excepting in the acute attack or in exacerbations of the chronic disease. During the acute attack or the exacerbation the disturbance was due to the pain and was manifested by nausea and vomiting.

INTESTINAL FUNCTION.—Constipation is the rule in cholecys-

titis and gall-stone disease. With obstruction of the ducts and jaundice, there are the usual clay stools and fetor. Usually the absence of bile from the intestinal tract results in lessened intestinal peristalsis and the tendency to flatulence. There is also present in the stool a larger amount of free fat than in the normal condition because of the loss of the influence of the bile upon the digestive power of the succus entericus and pancreatic juice.

DIAGNOSIS.—The clinical course of gall-bladder infections and cholelithiasis is quite uniform and a careful analysis of the symptoms and thorough investigation of the physical condition will usually enable one to make a diagnosis. Belly pain is a common condition. The nerve supply of the liver, gall-bladder, and ducts, and that of the stomach, appendix vermiformis, and head of the colon are so nearly the same that pain alone or its location cannot be considered absolutely as a diagnostic point in the involvement of any of these structures. However, the pain of gall-bladder infection and cystic duct involvement is usually located in the gall-bladder region and is referred to the lower end of the sternum and epigastrium and often to the right scapular region. Furthermore, palpation upon the gall-bladder region in this condition not only aggravates the local pain but especially intensifies the radiation to the ensiform appendix. Peritoneal adhesions between the gall-bladder and surrounding structures may result from other conditions than cholecystitis, *i.e.*, chronic ulcer of the duodenum and stomach. Recent adhesions are often painful and chronic ulcer of the duodenum or stomach with perigastric or periduodenal adhesions of the gall-bladder and liver may result in pain very similar to that due to gall-bladder infection or gall-stones. Occasionally pressure upon an infected gall-bladder radiates toward the appendix vermiformis. Renal colic may be accompanied with the radiation of pain into the gall-bladder region. Appendicitis, as you know, may be accompanied by a pain referred to any point in the belly outside of the appendix region. Occasionally the appendix may be so situated that it lies near the gall-bladder and an appendicitis in that location may present symptoms difficult to differentiate from cholecystitis. No careful physician will forget that acute infection of the pleura and lung may result in reflected pain along the lower intercostal nerves to the belly, with rigidity of the

abdominal muscles and abdominal tenderness, and that gastric crises of especially the early stages of locomotor ataxia may be mistaken for gall-bladder infection. This is not an uncommon mistake. In the last five years I have had in the Presbyterian Hospital ten patients suffering from gastric crises of locomotor ataxia who had been operated upon for cholelithiasis. Pott's disease of the dorsal spine with resulting pressure upon the posterior nerve-roots results in abdominal pain with rigidity of muscles and tenderness. Chronic ulcer of the stomach and duodenum usually has a classical and typical clinical course. A careful study of the patient's history, a careful physical examination, and a study of the stomach secretions, gastric motility and stools, with the further fact that pain of chronic ulcer is usually relieved by proper diet, will enable a diagnosis to be made.

In other words, while a diagnosis may not be definitely made in every patient suffering with cholecystitis, acute or chronic, with or without gall-stones, a sufficiently careful examination of each individual will usually enable one to differentiate this disease from practically all others of the abdomen.

THE PROGRESS OF MEDICINE DURING THE PAST TWENTY YEARS

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It is just about twenty years since I began the study of medicine, so that the features of medical teaching, and above all of therapeutics—for the physician's main function is to cure, that is to relieve patients—are reasonably fresh in my mind. In the early nineties the most interesting phase of medical teaching and the most prominent feature of therapeutics was antisepsis. Great progress had been made in surgery as a consequence of Pasteur's discoveries in microbiology and Lister's applications of Pasteur's method to surgical procedure. We had come to realize that nearly all surgical complications resulted from the growth of microorganisms in wounds or in the surgeon's incisions and that these could be prevented by killing the microbes by means of antiseptic solutions. Asepsis, or the prevention of infection, rather than antisepsis, the cure after microbic invasion, was only just beginning to make its way. Antisepsis was in the air and it seemed as though there ought to be some important applications of this principle to medicine as well as to surgery.

It was felt that if microbes could be exterminated in connection with wounds and surgical incisions they might at least be inhibited in their growth by various solutions used internally. The application of this principle led to the introduction of a number of drugs. Besides this it seemed to explain the successful use of a number of remedies that had been employed on merely empirical grounds for years before. For instance, all of us who were at the University of Pennsylvania will remember very well Dr. Pepper's recommending nitrate of silver for various stomachic conditions. Anyone who has administered it freely will know that it often does good though its mode of action is as yet not understood. With the idea of antisepsis before the profession it seemed as though the anti-

septic quality of the silver salt was its most important therapeutic effect and that this accounted for its usefulness. Mercury was used somewhat in the same way and its use in syphilis was explained on the ground that somehow it either actually exterminated or at least very much inhibited the growth of the micro-organism of syphilis. Lustgarten's bacillus was sometimes thought of at that time as the bacillus of syphilis, so the theory of causation and cure seemed quite complete.

Other drugs were introduced on this same principle of their antiseptic value, real or supposed. One of the substances that was most popular was creosote, used for consumption. There was no doubt at all that in the large doses of the drug that were sometimes given in the nineties the patient fairly reeked of it and the amount of it in the breath seemed to be quite sufficient to inhibit the growth of the bacillus of tuberculosis. In typhoid fever on the same principle various antiseptics were used. Salol for instance was used rather freely for a time, and salicylic acid. Certain mercurials in small doses were occasionally employed for it and a definite course in calomel was given because the antiseptic virtues of mercury were supposed to be obtained by the splitting up of the calomel in the intestines. There were scarcely any of the infectious diseases, even the so-called children's diseases or minor ailments, which did not share in this therapeutic fad of antiseptics. Whooping-cough was a favorite ground, and many preparations, iodoform, bromoform, and a number of antiseptic inhalants were employed. Some of these were also administered in tuberculosis with presumably good results on the same ground of their antiseptic virtue.

Now we have practically abandoned the idea of antiseptics in therapeutics. It seems likely that any antiseptic that will effectually kill a microbe or inhibit its growth will be just as likely to injure the cells of the body as much as if not more than the microbe. Body cells and microbes are both cells, and of the two probably the microbe is the hardier in its power of resistance. Hence the difficulty of finding antiseptics that will kill microbes without killing the cells with which they are in contact or seriously injuring them. The hope was that we should find specific antiseptics, that is remedies which would kill certain microbes without hurting the

cells of the body. Quinine and mercury seemed to be typical examples of such remedies. In malaria however, as the result of Laveran's work, we now know that we have to do with an animal parasite, not a plant bacillus, and in syphilis we have to do with a spirochæta, probably also an animal in character rather than vegetable. The vegetable cells apparently are entirely too hardy to be affected by anything that would not be much more serious for the body cells. We have simply gone back then from the hopes aroused as to the application of antiseptics in medicine to look for other kinds of remedies.

What has accrued to us of value from the interest in antiseptics is the advance in prophylaxis that has come. This is as true in surgery as in medicine. Out of antiseptics we learn asepsis. Out of attempts to cure disease by bactericides we came to appreciate the value of bactericides outside the body. The surgeons prevent infection. The physician now trusts very little to the idea of obliterating infection after it has taken place, but prevents it and above all prevents reinfection. We have learned to teach people how to dispose of the excreta and secretions likely to contain bacteria so that they may not reinfect themselves and surely not infect others. We have learned to help nature in her conflict with disease though we do not hug the fond delusion any more that we can cure disease. We can help patients though we have very little control over disease. Indeed, the key-note of present-day medicine might very well be expressed in what used to be a favorite maxim, it is said, of old Dr. Parry of Bath: "It is much more important to know what sort of an individual has a disease than what sort of a disease the individual has."

Before the end of the first half decade of the last twenty years diphtheria serum came to raise new hopes and apparently set new ideals in therapeutics. It looked as though for a time at least we were going to have a specific serum or antitoxin for every disease. If we could counteract the toxin of diphtheria there seemed no doubt that in the same way we should be able to counteract the toxin of every other form of infectious disease. At the beginning we did not quite know how diphtheria serum worked and so it seemed as though it opposed the bacterial action as well as neutralized the effects of their poisons. Now we know that its beneficial influence

was all exerted in counteracting the toxins and that it is after all an antitoxin quite limited in its effects. With some exceptions, few in number, that are still matters for discussion and trial, none of our hopes with regard to curative serums have been fulfilled. In tetanus the prospect was particularly bright, but unfortunately the first symptom of tetanus is the signal for the beginning of death from the disease as a rule, and it is too late for any serum to be effective. Perhaps Haffkine's serum does protect against plague. That remains to be seen. Flexner's work on cerebrospinal meningitis is brilliant and looks hopeful but the decision cannot be made yet. Let us hope that it will fulfill its promise.

In the meantime it is well for us to realize just how diphtheria serum was introduced and what its present position is. I remember seeing the first cases that were ever treated in this country by Dr. Louis Fischer of New York in 1894, I think. He had just brought back some of the serum with him from Europe. He got brilliant results. Others began to have brilliant results at once. The statistics of diphtheria treated by serum seemed to show that a magnificent new remedy had been discovered. It fairly won its way at once. Let us not forget however that the amounts of serum calculated in units of antitoxic value used in the first few years were so small that at the present time we would not consider that we were using serum at all, or would think that the physician was fooling with the remedy were he to give them. In nearly all instances less than 300 units of antitoxic value were injected, for the first two years. Yet in those early days we secured brilliant results.

I am not a doubter of the value of diphtheria serum. I am thoroughly convinced that the remedy is extremely valuable. As a medical historian, however, I feel that I must point out that its introduction was brought about by what the English call a fluke. The result was well intended but it was not accomplished by the means employed for the purpose. Something happened to help out diphtheria serum in the early days. There was little more than expectant treatment when the first doses of serum were given yet good results were secured. When this is taken in connection with the fact that other serums have proved nugatory it would seem as though there were some mystery in antitoxin which still remained

to be solved. An examination of the statistics of certain other of the children's diseases, especially scarlet fever, seems to show that the death-rate in that disease has been reduced nearly if not quite as much during the past fifteen years as that of diphtheria. It would seem then that the end of the consideration of the employment of antitoxins is not yet in sight and that we may still have a revolutionary discovery in this important matter.

Where the real advance has come is in the prevention of these infections. We have realized just how they are diffused and are gradually securing prophylaxis against them. Some of us have come literally to believe in the axiom that when a person dies of typhoid fever someone should be hanged. The spread of infectious diseases is usually due to criminal negligence. That criminal negligence is sometimes material and not formal as the old philosophers used to say. It is due to ignorance and not to intention. The time is coming, however, when ignorance will no longer be a justification. A farmer who spreads typhoid fever or scarlet fever or other diseases from his family to other families through milk will be liable for prosecution. Already a man who risks the spread of tuberculosis and other pulmonary diseases by expectoration in public places is amenable to law. We shall train our children so that there will be no "spitting sex"—for only males spit—though females have just as much need so far as their nature is concerned. When the boy does not think it manly to follow the example of his elders in expectoration there will be still less diffusion of disease.

The one thing that we have done well in the last twenty years in medicine is in developing the preventive side of medicine. The triumphs are the demonstration that yellow fever and malaria are conveyed by mosquitoes and only by mosquitoes and that by keeping the mosquitoes from patients suffering from these diseases they will not be distributed. We have learned the other lesson that flies may and indeed do convey disease and especially digestive diseases though it took the sad lessons of the Spanish War to impress this fact. We must not forget, however, that these are not new ideas. Long ago Father Kircher, in the middle of the seventeenth century, as quoted by Dr. Howard Kelly in his sketch of Walter Reed, declared that "flies and other insects carry disease" and

Dr. Carlos Finlay in Cuba had worked out in the late eighties his explanation of the spread of yellow fever through mosquitoes. The American physicians settled the practical side of these questions for all time while the Italians and the English were doing the same thing as regards malaria.

In tuberculosis also we have come to the recognition of the great possibilities of prevention. It is probable that we have very largely reduced the death-rate from this disease and that the future is likely to see further great reduction in this important matter. The crusade against tuberculosis is indeed the most important phase of medicine of the last ten years. In this too, however, we must not forget that over one hundred years ago they were applying these same principles to the prevention of the spread of tuberculosis in Naples and in Rome, and that we have laws declaring consumption or phthisis contagious and requiring that all the clothing that had been worn by the patient be destroyed and the rooms in which he lived thoroughly disinfected. Indeed they accomplished so much good by their crusade against tuberculosis in Italy that they very greatly reduced the death-rate from it, forgot its dangers and allowed their regulations to sink into innocuous desuetude and then the disease came back again. Besides the great model for this sort of work, the eradication of leprosy in Europe in the fourteenth and fifteenth century is a striking lesson of what can be accomplished if we will only imitate our ancestors of the long ago.

School hygiene and the examination of school children by physicians have meant much for the prevention of disease. This is extremely important for morbidity of other kinds than the infectious fevers. It is probable that the deaths from Bright's disease in middle life are often the result of kidney irritation or actual nephritis during the course of the severer infections of childhood. We know definitely that many of the infectious pulmonary diseases of childhood, measles, whooping-cough, and the like predispose to tuberculosis and are the real causes of death from that disease in early adult life. Here is where our great advance in medicine has come in the last twenty years. It is here, too, that the outlook is most hopeful. The treatment of these children's diseases is now eminently a matter of encouraging natural reaction. Air is admitted in abundance, the children are fed properly, a copious quantity of

fluids is allowed to them, and when there is respiratory difficulty they are treated practically out-of-doors,—these are the noteworthy advances in therapeutics. We give so little medicine now to these cases that it is a vanishing quantity. Individual patients sometimes need medicine for special symptoms. The diseases themselves have no drug treatment.

In the early nineties hypnotism as a therapeutic measure was attracting widespread attention in Europe and we were getting the echoes of it in this country. Charcot had been studying hypnotism very seriously and Louys, at the "Charité" in Paris, had been making some wonderful researches. Only the other day I was going over one of his papers, published at that time, which created a sensation. With certain subjects all he needed to do in order to secure the therapeutic effect, or the physiological action, and sometimes even the extreme toxic effect of medicine, was to put a phial containing it in the hands of his hypnotic subjects, or in contact somewhere with their bodies and then he got results. Ernest Hart, the editor of the *British Medical Journal*, exposed the fraud that was being practiced on poor Louys, who was being imposed on by his subjects. It is one of the best stories in the recent history of medicine. The Nancy School and especially Liebault and Bernheim were using hypnotism very strikingly. Berrillon in Paris was exploiting it when I made my studies there in '96 and "Trilby" had called wide attention to it. Hypnotism has simmered down. Now we know that anyone who wants to can hypnotize and that it is not a force that passes from the operator to the subject, but only such a concentration of the attention of the subject as enables him, or more often her, to use the personal vital forces that he has for his own benefit. A few men are still claiming to produce wonderful effects by means of hypnotism, but we know that these claims are exaggerated, that hypnotism injudiciously used can do much harm, and that while it has a definite place in therapeutics that place is quite small and unimportant.

Certain new discoveries in electricity called wide attention to the possibilities of the therapeutic use of this agent once more during the last decade of the nineteenth century. High-potency and high-frequency currents looked promising and Hertz's studies of ether waves in connection with electricity added force to this

promise. If we were to accept the claims made for these methods they would represent a revolution in therapeutics. In fact the greater the claims for any therapeutic agent the surer has been the inevitable disappointment in every feature during the last twenty years of medicine. Electricity has a definite place, but like hypnotism that is very small and it is probable that much more of its supposed influence is due to suggestion and the calmer state of mind in which, because of its use, patients endure expectant treatment than would otherwise be the case.

During the last decade I have seen every year at least one, and sometimes two, new cures for tuberculosis heralded in medical literature. I remember how seriously I used to take them in the early days and how my editor-in-chief used to smile at my enthusiasm. I thought him a hopeless skeptic, an old fogey who did not realize how scientific progress was going to revolutionize new treatment in a few years. I know better now, but the young men whom I meet and whom I try to discourage as gently as he did me, look at me as hopelessly conservative. The whirligig of time brings in its revenges and each succeeding generation squares up the accounts of the preceding one. It is wonderful to be young and enthusiastic, and the world would not get on without it, but in medicine one must be careful. Not a single one of the at least scores of tuberculosis cures that have come in during the last twenty years has made good. The period began with Koch's tuberculin. How interesting it is to realize that while Koch's tuberculin had the centre of the stage at the International Congress in Berlin in 1891 and proved an utter fiasco, Ramon y Cajal brought up from Madrid to that Congress his great discoveries in brain anatomy and they attracted the attention of only a few students though they have revolutionized our knowledge. That is the difference all through medical history between genuine observation and brilliant guesswork with fine spun theory behind it. Observation is not heeded, theory gets the trumpet in its hands and for a while no one can hear anything else.

We have had some most wonderful cures for tuberculosis. I wonder if rising physicians will remember them in order to keep from being so easily led astray again. There were injections along the course of the phrenic nerve in order to stimulate it,

and either by trophic influences or some way to cure the consumption. There was the injection of nitrogen into the pleural cavity. Nature, after all, sets a tuberculous lung at rest and this was one way of accomplishing the same purpose it seemed. Then of course there were any number of drugs to be used internally and by inhalation. Strychnine pushed to the limit, iodine used in various ways, arsenic or at least the arsenic preparations used up to physiological tolerance. Always in these cases an obscure drug given with the promise that the patients would surely get better, and suggestion and hope did the rest. Alteratives, whatever that may mean, were special favorites. They can be presumed to do almost anything and so they cured tuberculosis.

Then came the use of organic preparations in therapeutics. We had found that thyroid could be used to advantage in the treatment of cases where the thyroid activity was defective and then arose the question of using extracts of all organs. Once more it was theory that ruled and we had extract of heart, and extract of kidney, and extract of the liver, and extract of stomach, and of pancreas, and of spleens, and of bone-marrow, and all the rest. Wonderful cures were announced from the administration of these—or at least patients seemed to be benefited very much. Of them all probably only thyroid remains to us as a serious addition to our pharmaceuticals and even with regard to that we are not nearly so confident as we used to be.

The obscure diseases have all had their many cures announced. When inebriety took its place definitely in the list of diseases, for a time chloride of gold was said to be an infallible cure for it and an elaborate system of treating patients by it was created. Now we know that the cure of the drunkard depends on his own will and the help that can be given him by means of environment. Many systems of cures are still exploited, but there is just one successful means and that is so to arouse the patient's own will as to secure his co-operation. Nothing else avails. Drugs may prove eminently suggestive and a system will help to predispose them to make up their minds and get their wills into activity, but that is all.

In the old days of the Middle Ages it was thought that gold as a precious metal must be effective as a drug. On scarcely any

better grounds than this curious feeling it came to be used once more rather extensively in certain preparations at the end of the nineteenth century. Gradually the fad for using these remedies is going out and we have come to recognize their proper value. Slight tonic alteratives they are but scarcely more, yet when used with a strong suggestion of therapeutic efficiency behind them they seemed to work wonders. Among our drugs the old favorites still maintain themselves while many of the new ones are quite dubious. The coal-tar products have helped us to relieve much pain and reduce much fever, though they have been sorely abused and have probably done at least as much harm as good. The popular employment of them that has developed as the result of certain unfortunate methods in their sale and their use, even by physicians, has certainly worked harm to the community.

During the past twenty years, then, we have had many disillusion. We have added very little that is valuable to our drug treatment of disease. We have learned however to prevent disease, very efficaciously. Above all we have learned to apply natural methods for the treatment of patients so as to enable them to overcome their diseases. We have given up to a great extent the search for specifics. The antitoxins have disappointed us. Our only hope is to increase resistive vitality and nature's curative power. This can be done above all by an abundance of fresh air, by plentiful feeding wherever that is not contraindicated, by the use of hydrotherapy and by proper influence upon the patient's mind. We have come to treat our patients much more than their diseases. Diagnosis has developed and we recognize diseases much earlier than before and so we prevent them from developing to the extent that was common enough twenty years ago. Above all we have learned to care more faithfully for our patients in their convalescence and to bring about their complete restoration to health. We know the dangers from sequelæ and complications and the necessity for helping patients to avoid them. We are not curing disease more than before, but we are preventing suffering, lessening morbidity and greatly reducing mortality.

It is interesting to trace the vicissitudes of the treatment of pneumonia during the past twenty years. In the early nineties whiskey was the great stand-by as indeed it was in most infectious

diseases. It was used from the beginning, and men went so far as to say that they would rather treat the disease without all the drugs of the pharmacopœia, if they had whiskey, than with all the drugs if they could not use it. We are now far away from that standpoint. We still stimulate, but not until there are indications for it and then quite mildly. To some people pneumonia was a disease that required depressive measures. Consequently we had the use of aconite and of *veratrum viride*. Some of the older men in the nineties were sure that these were life-saving remedies. They were perfectly confident of them. I wonder if there is any serious student of disease who still employs them, or, if he does, uses them in anything like the doses that were then administered. There are certain cases that need depressive measures at the beginning,—for these may occur in strong, vigorous, healthy men who come down with an extensive pneumonia,—and for these very probably the best thing is bloodletting. Venesection has come into favor again for just these cases and for certain types of toxin accumulation in the system.

Another form of stimulation commonly used was large doses of strychnine from the beginning. In the late nineties a Russian military physician reported several hundred cases with but one or two deaths in which he had used large doses of digitalis from the beginning. He forgot how favorable was the prognosis of all his cases in young, healthy, vigorous soldiers as a rule and as the result of his report the use of digitalis was taken up. It has proved to be of no particular importance. The important thing with regard to pneumonia is fresh air. We used to treat these patients in stuffy closed rooms lest forsooth they should take cold. A distinguished Canadian practitioner said that if he had pneumonia he would rather be treated under the trees in the park than in any of the best hospitals of our cities. Our pneumonia cases are to-day being treated out-of-doors with better results than any of the old remedial measures gave us. For children and the old we have learned that abundance of fresh air is more important than anything else. In this as in every other form of disease natural remedies have proved the best. Unfortunately pneumonia has continued to increase in frequency, probably because our cities have been growing larger and more crowded, for pneumonia is a disease of

dense population. As yet we have been able to accomplish almost nothing for its prophylaxis.

Other phases of pseudo-scientific medicine came in connection with radiotherapy of various kinds. The X-rays seemed to promise all sorts of benefits when they were first exploited. There was a time about the beginning of the twentieth century when it looked as though surgery for malignant disease might be largely replaced by the X-rays. Our high hopes in this matter were destined to be disappointed and the X-rays have sunk into a very insignificant therapeutic position. Then radium, rather similar in its action, came to occupy attention and for a time looked as though it might accomplish all that the X-rays had seemed to promise. Physicians, however, had been warned by the disappointment over the X-rays and so radium never attracted such widespread attention. We have still not absolutely settled its place in therapeutics, but it would seem that it is to be quite unimportant. Other cures for cancer we have had and all of them have proved disappointments. In the early nineties they were still using certain obscure oils like chaulmoogra and a few years ago we used various pancreatic extracts. The good, if any was accomplished, was infinitesimal; the original good results on which the reputation of these remedies was founded were due entirely to suggestion.

What we are coming to realize better than ever before is the place of suggestion in medicine. All the new remedies for consumption that come and go have practically no beneficial effect on the disease or any physical or chemical *raison d'être* and their reputation is founded on the psychic influence of the confident promise that they will do good. Hence the exquisite truth of the French *bon mot* "take the drug at the beginning while it cures; after awhile it will be found out that it does not cure." We have learned that many other remedies really owe their effectiveness to suggestion. Strict Hahnemannism with its extreme dilutions owes all its supposed efficiency to nothing except suggestion. This is true for many another remedy that has had a reputation. In our day we have come to realize that suggestion need not necessarily be attached to a remedy and the patient may be cured. Christian Science cures merely by denying the existence of disease and so leading people to believe that they cannot be sufferers from what

is non-existent. This has no effect on organic disease, but it is positively curative for functional diseases of many kinds and it modifies very favorably even the symptoms of organic disease. Methods of new thought and new healing, so-called, use this power of suggestion by which the vital force of the individual is liberated in order to accomplish good in the cure of disease and above all in the relief of symptoms.

At the end of the score of years then, the most interesting feature of therapeutics is psychotherapy or the use of the mind. It is not new, but as old as medicine itself. It does accomplish excellent results, however, and at last it would seem that a deliberate use of it along definite lines laid down by psychology is going to add an important feature to therapeutics. Physicians have always used it indirectly and indeliberately, but now they appreciate better the force that they have been using. In this, as in everything else in medicine, there are already signs of exaggeration. The mind is being used too much as a curative agent to the detriment of other therapeutic measures. Psychotherapeutics like balneotherapeutics and climatotherapy and electrotherapy is not a cure-all, but only an adjuvant to other methods of treatment. It does present excellent therapeutic efficiency, but only in conjunction with other means of treatment.

We are prone to welcome the notion that superstitions have gone out of medicine. Medical literature of the present day contains many complacent references to superstitions in the olden time and congratulation that we have outlived them. People point to the use of excrementitious substances of various kinds, to the recognition of disease as due to witchcraft, or to changes in the moon's phases or the conjunctions of the planets. These forms of superstition we have outlived, but superstitions in medicine still continue. A superstition is an opinion still held after the reason for it, or supposed reason, has disappeared in the advance of science. It is a survival from a previous mode of thinking. 'Superstes' in Latin means a survivor. We have many survivors. Surely no superstition of the olden times was any more senseless than some of the pseudo-science of the last twenty years. We have an immense literature with regard to uric acid and the uric acid diathesis all of which is now just as great twaddle as

so much of mediæval medicine. Most of what has been written about intestinal autointoxications must be looked at in nearly the same way. It is a glittering generality that enables a busy or lazy physician to find a ready category for many affections. If these two subjects were cut out of the medical literature of the last twenty years we should have an immense hiatus where all is now packed full of supposed thought.

The most serious superstition, however, has been with regard to heredity. Twenty years ago most physicians were quite sure that a number of diseases were directly inherited. If our patients now come to us and say that they have stomach trouble but they suppose that is only what is to be expected since father or mother had stomach trouble, or make a similar declaration with regard to heart disease, it is because the profession held and discussed these ideas with regard to the influence of heredity twenty years ago. Of course there is no inheritance of acquired characteristics and no question of the inheritance of acquired disease. A tuberculous mother may have a tuberculous child, but that is because the tubercle bacilli pass through the placenta and directly infect the child. We do not think now that tuberculosis is hereditary and when we hear people talk about the inheritance of rheumatism and other such diseases we realize that superstitions are still with us. Rheumatism is an acute infectious disease and one might as well talk of a heredity in pneumonia as in rheumatism. One of our best advances in medicine has been the gradual limitation of the supposed influence of heredity. It may have some predisposing influence but even that is very slight. It has no direct influence. Defects are the subject of inheritance but disease is not.

There is just one lesson to be learned from the medicine of the last twenty years. We have not accomplished nearly so much as we thought we were doing but the reason for our failure has been that we were following theories and not making observations. Diphtheria serum cured; therefore we argued as a deduction that other serums must be curative and proceeded to waste much time in experimentation. Not nearly so much time would have been wasted, if men had only made their observations seriously, controlled them well, and kept from jumping to conclusions because of the persuasion that already existed in their minds as to the probable

success of serum-therapy in other diseases since it had succeeded in diphtheria. The same thing happened with regard to the organic products. Most of the other phases of failure to accomplish any enduring result during the last twenty years will be found to be dependent on this habit of deduction from known truths which men are so prone to. Prof. Osborne of Columbia once said with regard to theories in zoology that "nature never works as the closet philosopher anticipates her action." May I add to that, that nature is always simpler in her action than we expect her to be.

A typical example of the value of observation where theory had been fooling us for long came in the case of hookworm disease. We had theorized much and brilliantly about tropical anæmia and its connection with malaria and other fevers. The discovery of the little worm in the intestines of the anæmic brushed away all the theory and gave us a great advance in the treatment of patients suffering from anæmia supposed to be due to a variety of complex causes. We are only in the midst of another such advance with regard to pellagra. Twenty years ago no one would have ventured to say that hookworm disease was very common in this country. Ten years ago pellagra was supposed to be a disease confined to Italy or certainly to the southern countries of Europe. Now we know that there are probably thousands of cases of it in this country. Cases have been here for years, probably for half a century, and we have been explaining them learnedly by theoretic considerations, jumping to conclusions about them that made us think we know something about them when we really knew nothing. The most important axiom for physicians to remember is that of Bacon, who seven centuries ago declared that there were four principal reasons why men did not advance in knowledge. First, they did not observe; secondly, they did not observe accurately; thirdly, they followed blindly those who knew no better than themselves, but insisted that they did know; and fourthly (and most important), they were afraid to say "I do not know."

What we need at the present time in medicine is more candor with regard to our ignorance. To be able to say "I do not know" means that one's eyes will be open for possible explanations that may be secured by observation. To think that we do know when

our only knowledge is a bit of wordy theory is to shut our eyes because we do not realize that there is something to be found out in this matter. Josh Billings said long ago, "It is not so much the ignorance of mankind that makes them ridiculous as the knowing so many things that ain't so." Every generation of medical men has known a heap of things that "ain't so." Prof. Richet said not long ago, "The therapeutics of any generation is ~~always~~ absurd to the second generation after its time." That is as true for the last generation as it is for any other generation of human history. Many things even in the therapeutics of a generation ago are eminently absurd. They were supposed to be the most precious knowledge of that time. Can we not learn to say "I do not know" and try to find out in the next twenty years—and not be complacent and absurd in our false conclusions?

LUMBAR PUNCTURE; A FEW CASES OF SPECIFIC INTOXICATION AND INFECTIONS OF THE URINE

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LUMBAR puncture was introduced to the medical profession by Quincke, and it is of great importance from the standpoint of therapy, as an aid to the art of diagnosis, and as a procedure to produce anæsthesia.

Essential points in the technic of the examination of the cerebrospinal fluid are: first, the pressure under which it is obtained; second, its coloration (chromodiagnosis); third, bacteriological findings; fourth, cytodiagnosis; fifth, chemical nature; and sixth, cryoscopy of the fluid. Nearly all forms of micro-organism have been found in it. Diplococci are especially common in affections of the spinal meninges, but true gonococci are rarely found. Weichselbaum's *Diplococcus intracellularis*, the accepted cause of cerebrospinal meningitis, if found, settles the diagnosis in this disease. It is generally demonstrated without difficulty, and may be distinguished by culture methods from *Micrococcus catarrhalis*, which is much more easily grown at lower temperatures, and on all kinds of culture media. Hastings says that in otogenic infections arising from a pathological process in the region of the ear, there may be no micro-organisms in the cerebrospinal fluid. In the fluid withdrawn from hemiplegics the sign of older hemorrhages into the brain substance or the meninges were demonstrated in the form of hæmatoidin and hæmosiderin. The finding of the latter in the fluid might eventually be of value in the differential diagnosis between embolism and hemorrhages.

In the so-called microbial forms of meningitis, many kinds of bacteria have been found; the staphylococcus (by Josias, Thadelman), the streptococcus (Fraenkel and Weichselbaum), the pneumococcus, the Eberth bacillus, the colon, and tubercle bacillus. Ani-

mal inoculation is of especial value for the demonstration of tubercle bacilli, but the method demands at least three weeks time. The fluid is introduced into the peritoneum of guinea-pigs. The results may be negative for similar reasons as in the case of the cultures generally on account of the diminished virulence or the small numbers contained in the inoculated fluid. Inoculation was successful in 27 per cent. of the cases of tuberculous meningitis of Bernheim and Mosser, and in 30 per cent. of those of Wetter. The use of lumbar puncture in tuberculous meningitis has many adherents. It seems to have a sedative and analgesic effect, relieving the somnolence, and for a time even the coma, while the claim for relieving the intensity of the pain has also received favorable notice.

Huber is of the opinion that the therapeutic effect of lumbar puncture is a great one, and he uses it as a therapeutic measure in otitic serous meningitis, the cerebrospinal type of typhoid, and also in cerebrospinal meningitis. In hydrocéphalus, complicated by spina bifida, Kohts obtained good results. Bokey reports its curative effect in hydrocephalus secondary to meningitis. In one case of chronic hydrocephalus all the symptoms disappeared after eight months, during which time eleven punctures had been made, withdrawing in all about 283 c.c. ($9\frac{1}{2}$ fluidounces) of the fluid.

Guyard always obtained relief from headache, and secured sleep by means of the puncture repeated at intervals of from a fortnight to a month in a patient aged fifty-six years suffering from chronic nephritis. Donath has obtained good results from lumbar puncture in Huntington's chorea, cerebral venous hyperæmia and spasmodic torticollis. The headaches of Bright's disease were treated and improved by means of lumbar puncture by Pierre Marie and Georges Guillian. Schert states that the procedure brought relief with diminution of the albumin and a clearing of consciousness in a case of uræmia.

Sieffert also reported favorably on the effect produced by the puncture in cases of uræmia following scarlatinal nephritis. Korumji expects only palliative results in epilepsy, and does not expect a cure. Babinsky recommends rhachicentesis as a therapeutic measure in the management of ear affections, especially in auricular vertigo. The rhachicentesis was tried by Thetras with good results

in the treatment of deafness due to labyrinth trouble alone or complicated with other lesions of the hearing apparatus.

Deaths, attributed to the lumbar anaesthesia and to the intoxication from the drug used, frequently occur. Bier recommended a combination of cocainization with an artificially induced congestive cerebral hyperaemia. This is based on the well-known fact that the cerebrospinal fluid is rapidly drawn into the spinal canal when space is encroached upon. A congestive venous hyperaemia will artificially produce such an encroachment. Before the injection of cocaine or Bier's eucaine a bandage is placed so tightly around the neck that it becomes cyanotic. Leave the bandage in place for some time after the operation so as to circumvent the danger of a sudden back flow of the cocaine into the brain, together with the cerebrospinal fluid.

It is well established that spinal lymphocytosis is a constant finding in paresis. The increase is relative to the percentage of lymphocytes normal for the individual. Hereditary syphilis is perhaps the best known cause of lymphocytosis. Scurvy produces the same result. Sometimes the smaller, sometimes the larger lymphocytes are in the majority. Often no division between the two kinds is possible. Absolute lymphocytosis is very rare outside of lymphatic leukaemia. One case occurred at the Massachusetts General Hospital in Boston in 1894 in a child of six, who passed through an attack of bronchopneumonia with an uneventful recovery, the only peculiarity of the case being the marked increase of white cells, running up to 94,000, 69 per cent. of which were lymphocytes. During the convalescence the blood became normal and the child left the hospital well in all respects. Syphilitic infection is related to lymphocytosis etiologically, with the French theory as a basis, lymphocytosis being a sign of meningeal irritation. Pressure influences such as occur in hydrocephalus, uraemic and brain tumor, may have an etiological bearing. In one case of chronic congenital hydrocephalus, we have obtained a constant positive puncture. Slight lymphocytosis accompanies the uraemic state. In one case of brain tumor no lymphocytosis was found. Other conditions in which lymphocytosis is reported to be present are *herpes zoster*, *chorea*, *multiple sclerosis* and *mumps*. Trauma to the skull or spine is also responsible for a slight lymphocytic

increase. In a few cases where the examinations were made shortly after the trauma the fluid in one was negative and in two or three others a slight increase was observed. Red blood-cells were absent.

In syphilis, hereditary or acquired, the red cells may fall below one million and the leucocytes may rise as high as 20,000, sometimes up to 30 per cent. The hæmoglobin may be proportionally diminished or may be even lower than the percentage of red cells, so that a chloritic condition obtains. Syphilis is the most important factor. Lymphocytosis occurs in the secondary stage in both nervous and non-nervous tertiary lesions, and may be found many years after the disease is supposed to have entirely disappeared. Alcohol alone does not produce spinal lymphocytosis. In the alcoholic cases examined lymphocytosis was present in only two. Of these one had developed positive signs of paresis, and in the other anamnesis disclosed syphilitic infection as the cause. In such cases we must admit the possibility of the development of paresis or cerebral syphilis, and whether or not the continued presence of lymphocytosis in such a patient years after the lesion is a benign reminiscence of past disease or a malignant symptom of future nervous involvement, is a most serious question for further investigation. Lymphocytosis has been found in pachymeningitis hæmorrhagica by Von Jacksch. He found lymphocytosis also in two cases of brain tumor and one of cysticercosis. Zappert found normal blood in one case of cerebral tumor. Von Limbeck gives a single case, with autopsy. Rider records a few cases, in one of which was lymphocytosis. Rotch mentions a single case, complicated by appendicitis, in which the following count is recorded: Red blood-cells, 5,298,000; white cells, 37,500; hæmoglobin, 68 per cent.; large lymphocytes about 10 per cent.; eosinophiles, 2 per cent. In one case where tubercle bacilli were repeatedly demonstrated in the fluid obtained by tapping the pericardial sac, lymphocytosis was found. Mental conditions have shown varying results. A few cases of senile dementia, with arteriosclerosis and also hemiplegic attacks gave negative results, but a few cases of undoubted syphilitic etiology with hemiplegia gave positive results. In one case, a patient seventy years old (senile psychosis), lymphocytosis was positive. Chorea showed in 112 cases normal blood except for increased percentages of eosinophiles, as in Zappert's two cases.

Puerperal mania is to be distinguished from the delirium of puerperal sepsis by the fact that the latter shows lymphocytosis with an increased percentage of polymorphonuclear cells, while the former has no lymphocytosis. A case of puerperal mania, Mrs. E., seen by myself, showed red blood-cells 5,000,000; white cells 6500; hæmoglobin 84 per cent.; eosinophiles 8 per cent. Cases of dementia precox, manic-depressive insanity, hysteria, and infective exhaustive psychosis, all give negative results. In 3 cases of epilepsy 2 were negative and one positive.

The diagnosis rests on the following points. The color of the puncture—low in malignant, high in pernicious anæmia. No serious results have followed lumbar puncture. A few patients had headache and slight nausea the day following the operation, but otherwise (and this is peculiar) some of the patients were feeling pretty well. They said, "Oh, doctor! Operate on me again, please! I felt so happy when you took the stuff out of me!" Patients should not be punctured unless they can be put to bed immediately after the operation. To be of definitive value the puncture should be repeated two or more times at intervals of at least two weeks, but not more than 3 to 5 c.c. (1 fluidrachm) should be removed for diagnostic purposes.

A FEW CASES OF SPECIFIC INTOXICATION AND INFECTIONS OF THE URINE

THESE cases may be divided into two classes: first, cases in which the urine contains no sugar, but in which acetone is present in the breath, and acetone, diacetic acid, and possibly beta-oxybutyric acid are present in the urine; second, cases in which none of these products are developed, but in which the urine contains an excessive amount of urinary indican. In many of these cases the activity of the general metabolism is reduced, especially full oxidation, either on account of the low percentage of hæmoglobin (anæmia), or as the result of some slighter impairment.

Edsall (*Phila. Med. Jour.*, 1902) saw a man aged sixty-three who was attacked while at work; he became unconscious and cyanosed, with deep, full respirations, without stertor, eighteen to twenty per minute. The breath gave off a powerful odor of ace-

tone, which along with diacetic acid, was present in the urine. The patient remained unconscious for twelve hours, and then recovered.

Singer describes a case of nicotine poisoning, in which he found embolism of the coronary artery, gumma of the ventricular wall of the heart, Stokes-Adams syndrome, highly offensive stools and vomitus. The sudden onset of the disease after days of constipation, and the condition of the urine were remarkable, especially the enormous quantity of acetone in the urine without sugar.

Ditman and Welker give interesting statistics of the relation of creatinine excretion to body weight in the case of acute nephritis, due to morphine habit.

Body Weight in kg.	Creatinine in Gm.	Creatinine per kg. Body Weight.
71	2.23	31.5 mg.
80	2.16	27. "
57	1.69	29. "
79	2.21	28. "
63	1.70	27.4 "

Koch found the excretion to range from 26 to 30 milligrammes per kilogramme of body weight. While the lowest limit of creatinine excretion which must be maintained to insure the maintenance of health has not as yet been determined, future research will probably find here a signal which it will be dangerous to ignore for long periods without the danger of encouraging the onset of a chronic nephritis, in which case the "creatinine index" will become one of great practical value, capable of sounding the warning note for the necessity of increasing the activity of the oxidation process.

White and Wilcox have found that opium in the body, independent of any effect on the stomach, lessens hunger, decreases general metabolism and diminishes the amount of uric acid and carbon dioxide excreted—due to the diminished action of the tissues. By its use, therefore, the oxidizing functions of the body metabolism, considered desirable in nephritis, are diminished.

Edsall (*Am. J. Med. Sci.*, 1903) records cases of recurrent vomiting in children, probably due to acidosis, which were cured by the administration of twenty-grain doses of sodium bicarbonate; and I, myself, have seen a few cases of vomiting with acetonæmia which were cured by electricity.

A relative decrease of phosphates was found in cases of strychnine

nine poisoning, also with valerian. Strychnine is often excreted through the urine unaltered, though the amount is extremely small. In a criminal case I had to take the urine from a dying person through a catheter and examined it with a drop of sulphosalicylic acid obtaining a purple red color. This was my most successful experiment of this kind.

Oxybutyric acid has been found in the urine during the course of acute exanthematous conditions and in scurvy. It may also be found during insanity. There is as a rule a co-appearance of oxybutyric acid, acetone, and diacetic acid in the same urine.

Diacetic acid is a product of the further oxidation of oxybutyric acid, and eventually diacetic acid is decomposed into acetone and carbonic acid.

Von Jaksch (*Zeitschr. f. klin. Med.*, 1886) records the case of a man aged twenty-four who was suddenly attacked with a pain in the head, and with colic followed by tonic and clonic spasms. Acetone and diacetic acid were present in the urine.

In many cases of poisoning we find purely peripheral anuria, which is a frequent and important renal form. The true anuria is of renal origin, due to diseases of the kidneys, infectious diseases, such as cholera, renal troubles during pregnancy, toxic influences from certain antiseptic or anæsthetic drugs, or destruction of the kidney tissue by tumors, tuberculosis, hydronephrosis and pyonephrosis.

Marcus reports the case of a man twenty-four years of age who had frequently suffered since early childhood from a feeling of pressure in the left side and other symptoms of hydronephrosis. Three weeks before coming under observation he was seized with severe pains in the left lumbar region associated with chills and fever. His temperature rose to 39° C. (102.2° F.), and his condition was serious when seen. He was operated on immediately with good result. A hydronephrotic sac as large as an apple was found. The sac had become infected. In the urine pus was found in large quantity, from pus-producing bacteria, as streptococci and staphylococci.

Cases in which the urine contains an excessive amount of indican were observed in the Ohio State Hospital for the Insane. An excessive amount of indican was noted in each case, especially

in cases of epilepsy, morphine and cocaine poisoning; also in cases of acute alcoholism. Experiments on dogs which were fed with cultures of colon bacilli show that indican increased every other day when 200 c.c. (7 fluidounces) of bouillon was given. In cases of gastric ulcer and chronic gastritis produced by ptomaine poisoning, we found that indicanuria was present during the whole period of treatment, also in one case of Thomsen's disease characterized by the occurrence of tonic spasm as the result of voluntary innervation of the muscles.

It is doubtful if the indican is the sole representative of the toxic agency, as there are reasons for believing that toxalbumins may be formed by micro-organismal action, alongside of the indol, and that they are responsible for the symptoms, or at least for many of them, in many cases the symptoms bearing a strong resemblance to those of meningitis. In a woman the symptoms were extreme prostration, persistent vomiting, dilated insensitive pupils, heavy stupor, but not actual coma, which continued for more than thirty-six hours, when gradual recovery took place with a partial remission.

Stuertz (*Berlin. klin. Wochenschr.*, 1903) records the case of a youth of seventeen who was attacked with abdominal pain, vomiting, constipation, slow pulse with high tension, unconsciousness and clonic spasms with trismus. The pupils were widely dilated and insensitive to light. Temperature 37.8° C. (100° F.), and a great excess of indican present in the urine.

In a case of acute alcoholism I found urine of 1.032 specific gravity, with a strong acid reaction, red in color, cloudy, large sediment, no albumin; dextrose and maltose present in large quantities. Great excesses of indigo-blue and indigo-red, bilirubin and biliverdin, crystals of oxalate of lime, triple phosphates, leucine, leucine discs in large quantities and increased urea.

Wehrsieg gives the clinical history and pathological conditions found on autopsy of a case of sepsis from Friedländer's pneumobacillus met with in a female eighteen years old. Metastatic abscess in both kidneys have been found as a general infection of the whole body, and especially of kidneys and urine. The distinctive diagnosis was narrowed down to the *Coli hæmolyticus* and the pneumobacillus of Friedländer.

Cancer

THE SPONTANEOUS CURE OF CANCER

BY GUTHRIE McCONNELL, M.D.

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OF the many unanswered questions concerning carcinoma and other malignant forms of new growths one of the most important and interesting is whether or not such a growth can undergo spontaneous regression. Borst, in his text-book on tumors, claims that all the reports of the spontaneous disappearance of malignant growths rest upon errors in diagnosis. This statement seems, however, a little too sweeping and to rest very much upon the old feeling that if the patient recovers the tumor could not have been of a malignant character. It is not a matter of any doubt that carcinomatous growths have, after operation, undergone distinct regression and have remained quiescent for many years. If this can occur after operations that could have by no means removed all the neoplasm it does not require much logic to assume that similar processes might occur spontaneously. For many years it has been recognized that superficial nodules may undergo a decrease in size, and recently Handley¹ has advanced the following theory in agreement with his idea of the lymphatic permeation of cancer. The growth of a cancer focus is centrifugal in character and as it extends the central portion, the oldest, undergoes degeneration. There is at the same time an attempt to replace the destroyed cells by connective tissue. As this tissue is formed many of the cancer cells may be caught in its meshes and thus destroyed. In this way the process may be arrested, an occurrence that is more commonly found in the secondary than in the primary tumors. Other factors, however, have to be taken into consideration, and it may be that they are the more important. Of these there is that one covered by the term "bodily resistance," a phrase of general use and of little

accurate significance. It can, however, be brought rather more into prominence by taking up the various factors that may together constitute the "resistance."

It will be advantageous at this point to go into the animal kingdom and study there the spontaneous disappearance of malignant growths. The investigations that have been carried out with mice have yielded very interesting results even if, at the present moment, they do not seem to have brought us much nearer the solution of the many problems. Many men of the highest rank have reported many cases in which the tumor in the inoculated mouse has for some weeks shown a decided increase in size with a subsequent regression. Stating it in general terms we say that the body tissues have been able to overcome the proliferative activity of the cancer cell. Gaylord and Clowes² report no less than 101 clearly defined cases of spontaneous recovery of carcinoma in mice during the previous year. This many were found in 711 inoculated mice; Bashford, however, observed but one case in 3000. Their conclusions gained from the study of the above were: (1) That spontaneous cure of mice successfully inoculated with the Jensen tumor occurs, in their experience, in about 23 per cent. of the animals. (2) The chances of spontaneous cure are inversely proportional to the size of the tumor. The frequency of the occurrence and its distribution in animals suggests that it may be more frequent in human beings than is generally supposed. (3) The occurrence of spontaneous recoveries from cancer, indicating the existence of immune forces capable of terminating the disease, demonstrates that cancer is not necessarily incurable, and should serve as an additional stimulus to research directed toward the development of a serotherapeutic treatment. As the histological changes are practically the same, differing but in degree, a description of one of the above cases will answer for the rest.

MOUSE 335 F.—A slow growing tumor had reached a maximum of 10 mm. (0.4 inch) 112 days after inoculation, when it began to decrease, and in the course of 36 days fell to a diameter of 2 mm. (0.1 inch) when it was removed for examination. Examination with the low power shows the tumor to be surrounded by a well-defined capsule of fibrous tissue. One portion of this capsule contains a certain amount of fat tissue and some large capillaries. An inspection of the margin of the tumor shows a well-defined round-cell infiltration, with frequent small capillaries. The structure of the tumor

presents in the centre the usual characteristics of a tumor of this age, and consists of a large alveolus, the margins of which are lined by a cell-complex four or five rows deep. Generally speaking the centres of these alveoli contain necrotic material. The stroma is well defined, and shows marked evidence of round-cell infiltration throughout. The epithelial cells present the usual irregularity of outline, deeply stained protoplasm, and vesicular nuclei of this type of mouse tumor. Inspection of the margin of the tumor shows a great variation in the thickness of the capsule. In one aspect of the tumor it is a thin, delicate, but still well-defined structure, its outermost layers consisting of fibrous connective tissue, then a thin layer of fine fibroblasts intermixed with round cells. At this point the complex of tumor cells rests directly upon the delimiting capsule. The remaining circumference of the capsule shows, however, extensive round-cell proliferation, and here and there areas of well-defined granulation tissue. At one of the poles of the tumor this granulation tissue is very extensive. It has penetrated into the larger alveoli, and we find small nests of epithelium widely separated from each other by areas of proliferating connective tissue. Here and there we find remnants of the necrotic material from the centre of the original alveoli of the tumor. Viewed with a low power, the epithelial cells immediately adjacent to the connective tissue in those areas where the nests have been split up appear, as a rule, to be smaller and more deeply stained than the epithelial cells in the centres of the nests. The connective tissue has a plentiful supply of capillaries, and small areas of hemorrhage are frequent. Under the high power the margin of the tumor is of the greatest interest. Everywhere we find active proliferation of connective tissue, strands of which penetrate between the epithelial cells. Round-cell infiltration at the margin is very well defined. Where the epithelium is split up into small nests, the cells at the margins of these nests are atrophic, and the chromatin of the nucleus is uniformly diffused through its substance. The nuclei are small and deeply stained, the protoplasm is not stained as deeply as that of the cells at the centre of the nest and is scanty. Occasionally an isolated epithelial cell is found detached near the margin, in which case the nucleus takes the nuclear stain but faintly, the protoplasm has nearly disappeared. Occasional cells are also found about the margins in which the nuclei present characteristic karyolytic changes, the cells presenting the appearance of a remnant of protoplasm with chromatin irregularly distributed through it. Proceeding from the margin to the centre of these nests one finds that the cell boundaries of groups of cells near the margin are frequently indistinct. Here and there a group of several epithelial cells have coalesced, forming the characteristic pseudo-giant cells of Becher and Petersen. The cells at the centre of these nests are indistinguishable from the characteristic epithelium of the growing portions of the tumor. Karyokinetic figures are occasionally met with in the cells at the centre of the nests. Rarely they may be found nearer the margin, but never at the extreme margin.

Concerning Mouse 338 A the following few lines of description are important. The epithelial cells at the margins of these nests where hemorrhage has occurred show very marked atrophic changes. An examination of the relation of these areas of hemorrhage to the epithelium strongly suggests that there is some connection between the extravasation of the blood and the marked atrophy.

Ehrlich, in his experiments, found that if he transplanted a mouse tumor into a rat it would grow for a while but would eventually degenerate unless he returned it to an animal of the same race and strain as the first. In the transplanting there was carried along with the foreign tissue a certain substance, Ehrlich's "X body," that enabled the foreign cells to continue their growth for a short time. Theoretically it may be that a food substance was used up by the tumor before the growth had had time to cause the formation of a similar food material in the body of the new host. On the other hand, the "X body" might well be of such a character as to temporarily neutralize the resistant elements in the fluids of the inoculated animal. It is well known that in the bodies of all living animals there can be formed certain elements that resist the action of foreign injurious substances. It is also well recognized that all foreign materials do not act as antigens and consequently no protection is obtained from their presence in the tissues. Most of the infectious diseases will bring about an immunity of varying duration. Unfortunately cancer does not seem to have this ability to any large extent, but experimentation has shown that those animals that have spontaneously recovered from malignant growths are frequently immune to further inoculation. There has evidently been formed some material that is antagonistic to the multiplication of the tumor cell.

The important question is, what is the nature of this substance, or what is more likely, these substances? The toxic bodies that cause disturbances in the individual economy are largely of a proteid nature and can be destroyed by the action of ferments or enzymes. Throughout the animal organism we have many of these latter bodies, in fact the different cells possess more or less specific lytic compounds. We find too that abnormal cellular structures, as well as the normal, may possess ferments. According to Buxton,⁸ who investigated the enzymes in thirty tumors, seventeen carcinomas, seven epitheliomas and six sarcomas, it was found that amylase and lipase were almost always present. Oxydase was found as a rule while proteolytic ferments were found only occasionally. It was also noted that, as might be expected, boiling destroyed the action of these enzymes. Not only is the action of ferments exerted upon foreign cells but the cell that secretes the

digestive substance may itself be involved in the action. It has long been noted that when various tissues are removed aseptically and kept in a solution that prevents bacterial growth, they will undergo disintegration, in other words, an autolysis. Petry⁴ shows the autolytic ferments to be particularly active in carcinoma, but that they are not absolutely specific in their action, as the albuminous bodies in other cells may be affected. He has also noted that the proteolytic action of the blood is marked in advanced cases of cancer.

There are then two factors of importance in the mechanism of protection against the invasion of foreign cells. On the one hand are the protective ferments of the invaded body, on the other the enzymes of the tumor cells capable of exerting an autolytic action. Theoretically cancer might be controlled either by increasing the activity of the body enzymes or by enhancing the power of the autolytic ferments of the tumor cell.

In the regression of tumor nodules the process may be largely due to the setting free of autolytic ferments as the tumor cells die from imperfect nutrition. The invading cells immediately adjoining such areas will be exposed to the same action and consequently their activity will be inhibited, new connective tissue formed and a process of healing instituted. That this does occur to some extent in many cases is undoubted and that it is very marked in a few instances is admitted as well. Some three years ago Czerny⁵ reported a number of cases in which malignant growths either did not recur or else remained latent for periods of years after operations in which the entire growth could not be removed.

His cases are as follows, the reports being more or less summarized:

CASE I.—Woman, both of whose parents had died from cancer. She was operated upon for carcinoma of the breast in January and in September, 1895. In May, 1896, three small nodules appeared in the scar and were removed. This operation was followed by a slight attack of erysipelas. Since then the patient has been free from any recurrences although twenty years have passed.

CASE II.—A woman, 47 years old, who for six months had had a foul discharge from the vagina. Examination showed a carcinoma of the vaginal portion of the cervix with such an involvement of the parametrium that a radical operation was not deemed feasible. In 1901 the ulcer was thoroughly curetted, cauterized and then a tampon of gauze saturated with a 30 per cent. solution of chloride of zinc was applied. Five years and three months after the operation the supposedly inoperable growth was well. The diagnosis was made microscopically.

CASE III.—A case of cancer of the flexura sigmoidea in which the line of resection was found to have been made in the involved tissue. Five years after the operation is apparently well.

CASE IV.—In this a carcinoma situated high up in the rectum and an involved inguinal node were removed. After such a necessarily incomplete operation the patient lived for seven years before dying of a diffuse carcinomatosis of the peritoneum.

CASE V.—A woman from whom a carcinoma of two years' duration and the size of a fist was removed from the sigmoid. Although it was adherent to a loop of the small intestine and consequently a radical operation was impossible the patient at the end of four years shows no trace of a recurrence of the tumor.

CASE VI.—Woman, aged 54. Case of sarcoma of the upper jaw. In January, 1903, as much of the growth as possible was removed and the wound cauterized. On February 21 operated upon for a recurrence. Operated again April 22 and November 20. X-ray treatment started December 9. On February 15, 1904, the right ethmoid had been transformed into a tumor mass; this was removed and cauterized. Four months later the right upper jaw was removed. Since then, a period of two years and three months, there has been no recurrence. Microscopical diagnosis: round-cell sarcoma, in many places showing a distinct alveolar structure around blood-vessels, perithelial sarcoma.

CASE VII.—Man, aged 53. Round-cell sarcoma of the clavicle. Operated upon for the first time in March, 1893, and on the following dates for recurrences, December 1893, March 1894, December 1895, and in December 1896 for the last time. No recurrence up to 1906.

Daneel (quoted by Czerny) reports eleven cases of cancer of the stomach, in which a gastro-enterostomy was done, that were well at the end of varying periods. Over two years, without recurrence, two patients; over four years, one; over five years, one; over seven years, one; over eight years, three; over nine years, two; over fourteen years, one.

Orth⁶ reports a case of malignant adenoma of the rectum in the practice of Prof. Rotter. The growth was removed and when the patient died three years later from a malignant adenoma in the pelvis no traces were found at autopsy of the original disease. The tissues were examined microscopically by Orth.

Pearce Gould⁷ reports the following: In 1880 the patient had her left breast removed for a typical scirrhus, microscopically diagnosed. In 1895 she was emaciated and dyspnoëic, with numerous secondary skin nodules, large axillary and supraclavicular nodes on both sides and a cancerous fracture of the neck of the left femur. Between March and November, 1896, the skin nodules shrank and were converted into keloid scars. The glands disap-

peared, the fracture united and all evidences of growth had disappeared. By 1899 all the scars had become soft and supple and the general condition had further improved. The patient had not been seen since 1906.

Handley⁸ reports a case of a woman of 80 who had been operated upon for cancer of the breast twenty-eight years previously. Since then there have been occasional operations for recurrences. Transient nodules appear in the scalp, and the subcutaneous tissues of the forehead are rough and granular to palpation, as indication of permeated lymphatics. Handley thinks that this case should be considered one of natural rather than of operative cure. He also reports another case in which a woman had her right breast removed in 1894 for cancer. Was operated upon for recurrences in the breast and in the axilla in 1896 and 1903. In 1905 she developed a brawny arm and died in 1908 from internal metastases—fourteen years after the original operation.

Mohr, quoted by Czerny, reports a case of inoperable carcinoma of the mucous membrane of the cheek in a man of 66 in which the growth regressed spontaneously and completely disappeared in the course of two and a half years.

A most interesting case is reported by Dr. C. G. Mackay⁹ of an unmarried woman of 37. It will be quoted quite fully:

CASE VIII.—Miss X, 37 years. Admitted to the hospital in November, 1904. Had a lump in her right breast since April, but was in good health. On November 4, 1904, a complete operation was done, breast and axillary nodes removed. Microscopic diagnosis showed the common form of scirrhus carcinoma. In January, 1906, she again came to the hospital, at which time there were small fixed nodules in the scar, a large fixed one below the clavicle and a bulging of the sternum. Was impossible to operate so the X-rays were used with the result that the disease appeared to be arrested. In August, 1906, she returned for more X-rays. At this time she had an irritating cough, which was regarded as being due to pressure upon the recurrent laryngeal nerve, and there was a marked degree of breathlessness and also dulness over both pleural cavities. On the first occasion on which she was tapped 40 ounces of blood-stained fluid were withdrawn from the left pleural cavity and 10 ounces of similar fluid from the right side. After the tapping there was dulness up to the lower border of the scapula on each side and there was also dulness of the right apex. A fortnight later 28 ounces of blood-stained fluid was withdrawn from the left pleural cavity. The breathlessness returned. An attempt was made to tap the left pleural cavity but only a few ounces of blood-stained fluid were withdrawn. She gradually failed in health and went home on November 8, 1906, where for several weeks in December she was in a state

of semi-collapse. The disease was then evident by a deep blue discoloration over the whole front of the chest from the clavicles to a line a little above the level of the upper margin of the liver. The left breast was of great size and hard. The left axilla was obliterated, filled with malignant growth. In the right axilla matters were much the same, though not quite to the same extent. Both sides of the chest contained fluid almost up to the clavicles. The respirations were 44. Swallowing anything, even a teaspoonful of water, was difficult and at times impossible. This state continued up to and including December 27, 1906. On the morning of December 28 it was found that the condition had entirely altered. She was much better and felt comparatively comfortable. She could swallow quite easily and the respirations had dropped from 44 to 24. The fluid in the chest was in greater part gone. She gradually took food in fairly good quantities and improved in every way. Still more remarkable was the fact that the seat of the local disease (the front of the chest) gradually underwent a change for the better quite as great as that in the general condition. In its whole extent the deep purple discoloration became very markedly lighter. In some places the skin regained its original whiteness and where it had been tensest and shining became at first wrinkled then flaccid. The diseased parts that had not been treated with the X-rays have undergone an extraordinary change. On the left side the breast, which had grown to a large size and felt hard, has absolutely disappeared with the exception of a circular flat disc the size of a sixpence, fully one-eighth of an inch thick, brown-yellow and of horny consistency and appearance, which occupies the place where the nipple had been. There is no trace of a gland and where it had been the skin is flat and close to the ribs. The left axilla, which was full of cancerous growth, is now a cavity into which a closed hand can be placed. In the right axilla there is a similar change. The space where the right breast, which had been excised, had been and the parts adjacent which had been subjected repeatedly to X-ray treatment showed an improvement that was decided but which had gone on at a slower pace. The cough which had never been absent for ten months ceased on January 6, 1907, and has not been heard since. Up to February 11, 1907, there has been a steady improvement in every way.

Dr. Eugene Hodenpyl¹⁰ has recently published an account of a case that in certain respects closely resembles the one reported by Dr. Mackay. In this instance the patient was a woman of 37 on whom a radical operation for carcinoma of the breast had been performed. Multiple recurrences soon followed, these were removed. Others soon appeared but on account of the patient's poor condition were not removed. Secondary tumors appeared in the liver, which nearly filled the abdominal cavity. This was followed by an excessive chyloform ascites. Instead of death ensuing the patient's condition improved. The tumors in the neck and breast gradually dwindled and disappeared. The abdominal tumors grew smaller and became imperceptible, while the liver became smoother and smaller. At length, about four years after the first operation,

the liver is approximately normal in size and position. With the exception of the scars and decreasing emaciation, and extreme chyli-form ascites, requiring frequent tapping, there is now no indication of the original disorder. The ascitic fluid was taken and injected into mice that had cancerous growths. These injections were made near the tumors, into the tumors, and into the body at large with a resulting necrosis of the growths, a noteworthy diminution in their size or a complete disappearance. Having proved the harmlessness of the injection the same procedure was carried out in human beings suffering from cancer. These injections were made in small quantities, near or directly into the tumors, or in large quantities into the veins. The general effect of these injections in man has been nearly uniformly to induce a temporary local redness, tenderness and swelling about the tumors. Then occur softening and necrosis of the tumor tissue, which is now absorbed or discharged externally, with the subsequent formation of more or less connective tissue. In all cases the tumors have grown smaller, in some they have disappeared altogether. In no instance has any tissue in the body, other than the tumor, shown the least reaction after the injections, nor have any systemic effects been manifest even after large venous infusions. The greater number of the forty-seven cases thus far treated were distinctly unfavorable, many of them being hopeless and inoperable.

The following case was one reported by Dr. Fischel:

CASE IX.—Mr. C. T. R., aged 29, white. In February, 1907, while lifting a trunk had a sensation as if something had given away in his left side beneath the lower ribs. After a little more than a year, July, 1908, he came to the hospital. Examination showed a soft mass about the level of the ninth and tenth ribs. At the operation this mass was found to consist of a cystic formation filled with a brownish-red, thick, grumous material resembling broken-down splenic tissue. Microscopically the broken-down material was found to consist of splenic tissue and masses of large endothelial cells arranged in alveolar fashion around blood spaces. A perithelial sarcoma, or, more correctly speaking, an endothelioma. Up to November, 1909, the patient had been attending to his business, that of travelling salesman, had gained in weight and apparently has had no return of the trouble.

In the cases that have been mentioned, both those in human beings and in mice, there has been a tumor present which for a while has undergone growth and in some instances given rise to metastases.

Then for some unknown reason the carcinoma has undergone regressive changes with partial or complete disappearance. The affected individual has recovered and in the lower animals an immunity has been established. This being shown by their successful resistance to further inoculations with other mouse tumors. The point of interest in this question is as to the method by which the tumor tissues are destroyed and the immunity established. Of the various forms of mouse carcinoma the hemorrhagic variety is as a rule less virulent than other forms, the percentage of takes is usually lower. In Gaylord's description of the changes occurring in the regressive mouse tumors, he says in one instance: "The epithelial cells at the margins of these nests where hemorrhage has occurred show very marked atrophic changes. An examination of the relation of these areas of hemorrhage to the epithelium strongly suggests that there is some connection between the extravasation of the blood and the marked atrophy."

In another paper dealing with malignant disease of the spleen we have shown that such conditions offer a fairly good prognosis following operation. In a large percentage of cases the patient has remained well for periods of from two to six years after the operation. It is well known that certain organs of the body are much less susceptible than others to secondary growths. The spleen is very rarely involved while the liver is almost always attacked. It is therefore evident that there exists a distinct organ immunity. This is particularly well marked in the spleen, an organ whose duty largely consists of the destruction of red blood-cells. From the broken-down corpuscles lytic bodies could be released and these acting upon the tumor cells destroy them. These latter in turn by setting free autolytic substances would assist in their own destruction. In both Dr. Mackay's and Dr. Hodenpyl's cases the regression took place after the formation of large collections of fluids within the serous cavities. The tumor masses then begin to degenerate, become necrotic and are cast off or absorbed as the exudate is taken up into the general system. It would seem that after a certain point has been reached that there are formed in the patient substances that exert a distinctly lytic effect upon the tumor cells. Dr. Hodenpyl's experiments in using the ascitic fluid as a therapeutic measure indicate that there is some substance present in

this proteid exudate that exerts an active influence upon the growth. The next step therefore would be the obtaining of a supply of a lytic serum that could be used in the treatment of malignant disease. Attempts have been made in an effort to obtain an anti-serum by means of injecting tumor material into animals but so far without success as the cells do not appear to act as antigens.

The curative action of the serum in these instances of regression of malignant growths is apparently not of an antitoxic nature so much as it is that of a lysis of specific cells.

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SOME REMARKS CONCERNING SO-CALLED INOPERABLE TUMORS—WITH SPECIAL REFERENCE TO THOSE OF THE PAROTID GLAND

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ONE of the most interesting and sometimes most perplexing questions which can be brought before the surgeon for decision is, whether a tumor presented in any given case is operable or otherwise. As is well understood, some growths may be readily looked upon as distinctly inoperable from their size alone without the question of malignancy being considered. Others much smaller in size, yet benign, may become exceedingly serious and perhaps inoperable, much depending upon their location. As a general proposition, however, neoplasms of the latter class may be considered as subject to surgical attack.

Very large osteomata involving the skull are ordinarily thought to be inoperable, and formerly the same view held good as to similar growths of the extremities, since the extensive dissection necessary for their excision would most likely be followed by infection, thus jeopardizing the patient's life. With the present modern and improved methods of technic, however, these latter neoplasms are no longer classified among the so-called inoperable tumors.

Rapidly developing neoplasms of the extremities, with marked glandular enlargement, soon reach the stage where it would be manifestly unwise to interfere. Such growths are usually malignant in character, and where there is extensive involvement of the superficial lymphatics, as more often than otherwise happens under such circumstances, it is fair to presume that the deeper glands are likewise implicated and that metastasis is almost certain; therefore, even though apparently the original growth might be easily extirpated, the futility of attempted surgical eradication of the disease readily becomes apparent.

An interesting case illustrating the point just mentioned recently came under my observation. The patient, a colored man, presented a tumor the size of an orange on the left side of his neck, which he claimed had appeared suddenly and had existed only a few weeks. Inspection revealed a mass in the abdomen lying behind the intestine near the kidney region and rather firmly fixed to the posterior abdominal wall. From a hasty examination made at that time it appeared that the right kidney was seriously involved. Subsequent investigation, however, disclosed the fact that the growth was situated nearer the median line, and that the kidney implication was only an incidental factor. On further examination a small growth was discovered in the right testicle. This testicular tumor was such as would permit of easy removal, but the palpable involvement of the lymphatic structures in the abdomen, in the thorax, and in the neck, at once rendered the case distinctly inoperable.

A rather unusual feature in this case was that a direct chain of lymphatic invasion could be traced from the right testicle to the left side of the neck. The abdominal glands on the right side were markedly involved, there was hydronephrosis from pressure on the pelvis of the right kidney, the lymphatic enlargement continued to the thorax, the bronchial glands were implicated, those of the left side showing greater enlargement, and finally the supraclavicular glands were markedly increased in size, all showing similar growth and characteristics.

Dr. C. W. Field, who performed the necropsy, makes the following report:

Autopsy (No. 476) performed thirty-six hours after death. Anatomical diagnosis: Neoplasm of testicle, lumbar lymph-nodes, also of the liver, lung, etc., and nodes of these areas: chronic nephritis with right-sided hydronephrosis.

T. R., colored, aged thirty-four years; six feet tall, weight about one hundred and fifty pounds; fairly muscular male, but poorly nourished.

Externally.—One scar 1 cm. (0.4 inch) long, 2 cm. (0.2 inch) wide, surrounded by dark pigmented zone 0.5 cm. (0.2 inch) in width, situated 7 cm. (2.8 inches) to right of umbilicus and 2 cm. (0.8 inch) above. Swelling on lower portion of neck about 8 cm. (3 inches) by 6 cm. (2.5 inches) rising above the ribs and extending to the left. On the right side there is a slight fulness. Right testicle 8 cm. (3.2 inches) long, 4 cm. (1.6 inches) wide and 4 cm. (1.6 inches) thick; scrotum not much stretched. Left testicle normal.

Autopsy Incision.—Begins at manubrium sterni passing to left of umbilicus down to the symphysis pubis.

Left Pleural Cavity.—Firm adhesions posteriorly over lower lobe, also over apex and anterior surface, of left lung. Lower lobe contains a large, soft neoplastic growth 3.5 cm. (1.4 inches) in diameter. Bronchial lymph-nodes enlarged (but not as much as on right side). Upper lobe (at apex) contains large ovoid mass of neoplastic tissue irregular in shape, 5 cm. (2 inches) by 4 cm. (1.6 inches) by 6 cm. (2.4 inches). Another neoplastic mass 4 cm. (1.6 inches) by 3 cm. (1.2 inches) by 4 cm. (1.6 inches) attached to pleura but not involving lung. Passing along trachea from left apex of lung there is a large neoplastic mass 10 cm. (4 inches) by 6 cm. (2.4 inches) by 10 cm. (4 inches). On section it is yellow-gray with reddish mottling scattered here and there, especially in upper and lower poles. It passes into the neck under

the clavicle and two upper ribs, and is covered by the neck muscles, fascia, and skin.

Right Pleural Cavity.—Contains 300 c.c. (10 fluidounces) of turbid bloody fluid. Right lung, upper lobe apex of rather firm consistency, small scar in apex 1 cm. (0.4 inch) below surface denoting neoplastic growth 3 cm. (1.2 inches) in diameter. Surrounding lung tissue markedly oedematous probably due to presence of neoplastic growth. Tumor is mixed in color, yellow with pinkish areas. Slight anthracosis.

Pericardial Cavity.—Pericardium contains 30 c.c. (1 fluidounce) bloody fluid. Pericardium smooth, few fibrous plaques. Heart rather small for the man's size. Walls of left ventricle somewhat hypertrophied. All valves of heart normal.

Abdominal Cavity.—Slight amount of blood-serum in the peritoneal cavity.

Liver.—Large, surface smooth, except for seven neoplastic masses,—six on right side, and one on left. Of these masses four measure 3 cm. (1.2 inches) in diameter, raised above liver surface with slight depression in centre. On section the masses are soft, pinkish yellow in color. Liver on section brownish, the consistency soft; shows nutmeg markings. Many smaller neoplastic masses throughout organ.

Spleen.—Normal in size, marked fetal lobulations. On section appears normal.

Pancreas.—Appears normal.

Right Kidney.—Region of right kidney, large kidney-shaped mass, 25 cm. (10 inches) long, 12 cm. (4.8 inches) wide, 10 cm. (4 inches) deep. Consists of a cyst (which is the pelvis of the kidney) containing a little over a litre (1 quart) of clear urine. Kidney on section slightly compressed. The right adrenal gland is normal. Just below kidney in median line extending to right side there is a dense lobulated tumor 12 cm. (4.8 inches) by 15 cm. (6 inches) by 8 cm. (3.2 inches), which on section presents same appearance as neoplasms in other portions of the body. It is evidently a densely infiltrated mass of lymph-nodes, most probably the lumbar lymph-nodes.

Left Kidney.—Adrenal gland normal; capsule markedly adherent; cortex thin tissue, opaque, and markings blurred. No tumor masses in kidney.

Intestines.—Normal except duodenum, which is firmly adherent to the retroperitoneal tumor mass, also greatly enlarged and dilated just below the pylorus forming a pouch about 5 cm. (2 inches) in diameter.

The lymph-nodes along the abdominal aorta on right side show marked neoplastic infiltration.

Bladder.—Normal.

Prostate.—Normal.

Right Testicle.—Is 8 cm. (3.2 inches) long by 4 cm. (1.6 inches) thick; cystic at lower end, containing about 30 c.c. (1 fluidounce) of hydrocele fluid. Testicle infiltrated throughout with neoplastic tissue showing same picture as other tumor masses.

Left Testicle.—Normal.

Malignant neoplasms of the upper and lower jaws become inoperable much sooner than similar growths of the extremities, and the same statement is also true of tumors of the parotid gland. I

wish to distinctly emphasize the fact, however, that the observer may oftentimes be mistaken in concluding that a given neoplasm is malignant and inoperable, when, in truth, it may be of benign type, and should then be considered strictly within the possibility of relief by surgical intervention.

An instructive example of this character came under my observation in October, 1908. The patient, a male, white, thirty-six years of age, presented the following history: About ten years previously he noted a nodule the size of a pea on the right side of his neck posterior to the angle of the jaw. The tumor gradually became larger, and four years later when it had attained the size of a small egg was excised by a surgeon in the country.

Soon thereafter another growth appeared in the same region, which naturally led to the suspicion that the second tumor was a recurrence of the original disease, therefore the probability of malignancy was rendered greater. This second growth steadily increased in size, and four years ago was treated for several weeks with the Röntgen ray. Despite this treatment, however, it continued to enlarge, and during the last few months quite a rapid growth had been noted.

On October 24, 1908, when I first saw the patient, the tumor was as large as a cocoanut (see Fig. 1). It extended to the face, pushing the lobe of the ear upward, reaching forward to within an inch of the skin, and well under the margin of the jaw. The skin over the growth was glazed, somewhat reddened, and covered with small dilated blood-vessels. It also exhibited some pigmentation, most likely due in part to the action of the Röntgen ray. The resultant scar from the former operation was plainly visible near the middle of the skin covering the tumor. Examination of the throat demonstrated that the growth extended well into the neck pushing the palate forward and the lateral wall of the pharynx inward almost to the median line. The mucous membrane of the pharynx did not seem to be involved.

The patient had lost no flesh and appeared to be well nourished, and while the suspicion of malignancy was strong, I reasoned that if malignant degeneration were present it must be recent in its development. However, a tentative diagnosis of malignant disease was made. The tumor was globular and tense, yet fluctuant, and the portion palpable in the throat was well rounded and about the size of a hen's egg.

After having fully explained to the patient the danger incident to surgical intervention under the circumstances, and the likelihood of recurrence if the tumor proved malignant as we suspected, he was still extremely anxious that something should be done for his relief and insisted upon operation. Accordingly on November 6, 1908, the growth was removed through an incision beginning just above the tragus and extending downward in front of the ear to the angle of the jaw and forward beneath the jaw almost to the symphysis. To this was joined a short incision posterior to the ear. The facial and internal maxillary veins were secured just before their junction, the facial artery was also doubly ligated, and free dissection made down to the capsule of the tumor. The digastric muscle was not severed but was deflected to the inner side, and the tumor was freely loosened from its attachments, the fascia over

FIG. 1.



Patient with tumor of the parotid gland before operation.

FIG. 2.



Same patient as in Fig. 1 after operation.

it being pushed forward in front of the ear in order to avoid as far as might be possible any damage to the facial nerve. After this had been accomplished the skin over the front of the tumor was dissected free and its upper portion carefully excised. Removal of the growth was then comparatively easy, the external carotid artery having been ligated just below the parotid gland.

During dissection and removal of the growth the submaxillary gland was extirpated, and following its removal a second nodule lying against the wall of the pharynx was easily hulled out with the fingers. In addition to the tumor a number of small lymphatic glands were removed. Hemorrhage was readily controlled with the exception of some slight oozing under the posterior border of the masseter muscle where a small nodule was situated. A considerable portion of the skin, showing some points of infiltration, was excised.

On November 17, 1908, the patient left the hospital with the operative wound entirely healed and everything in good condition, and September 14, 1909, was reported to be in excellent health (see Fig. 2).

The pathological findings demonstrated the tumor to be a benign myxoma probably having its origin in the parotid gland. I might add in this connection that one or two other surgeons had examined this patient and refused to operate, believing the neoplasm to be malignant and distinctly inoperable.

The history of another example illustrating the same point may not be entirely devoid of interest. It was one of malignancy of the parotid gland which had been rejected by a number of competent surgeons as being inoperable six months before the patient came under my care. This patient was not only successfully carried through the operation, but lived in comparative comfort for three years afterwards. The case teaches us that in many instances conditions which apparently offer no hope of benefit from surgical intervention may be successfully operated upon, and not only afford the patient prolongation of life but a fair degree of comfort during such time.

Mrs. B., aged thirty-eight, came under my care July 31, 1905, with a family history free from carcinoma, except that one maternal aunt died from cancer of the breast. In 1902, about a month after her child had passed through an attack of mumps, she noticed a small lump below and in front of the left ear, which she naturally thought was parotitis. The nodule was the size of a small marble, tender and hard. It gradually increased in extent until at the time of my examination a diffuse mass presented internal and posterior to the lower jaw, only partially movable, apparently involving the tonsil, and pushing the left pillar of the fauces against the right wall of the pharynx. She complained greatly of difficulty in swallowing, and had lost twenty pounds in weight as a result of imperfect nutrition. There was also considerable interference with respiration from pressure of the mass within the throat. There was no cachexia, but the submaxillary glands were markedly involved on each side, the left more than the right.

For eight months this patient received treatment by means of the Röntgen ray without noticeable benefit. Diagnosis was made of malignant neoplasm of the tonsil probably implicating a portion of the parotid gland.

On August 7, 1905, she came to operation, fully understanding the gravity of the situation. The Cheever incision was employed, after a preliminary tracheotomy had been performed. This consisted in a curved incision over the sternomastoid muscle from the mastoid process down to the lower part of the neck, joined at about its centre by another incision below the jaw and extending forward to the median line about 2.5 cm. (1 inch) below the chin. The common carotid artery was secured below the omohyoid, the facial artery as well as the internal and external jugular veins was doubly ligated, and careful dissection made down upon the growth, which was found to be encapsulated. The posterior portion of the ramus and angle of the jaw had been destroyed by pressure. The tumor was isolated and enucleated after the upper end of the internal maxillary and external carotid arteries, together with all branches, had been controlled.

The neoplasm was found to be about the size of an orange. A portion of the wall of the pharynx was excised, together with some of the attachments of the soft palate, the parts being carefully sutured. The submaxillary gland was extirpated in the early part of the operation.

On August 13, 1905, a small slough was removed from the site of the tumor, and the communication with the pharynx caused some suppuration, but the patient's convalescence was not seriously interrupted. The tracheotomy tube was removed on the third day. Some slight induration developed after repair had progressed for several weeks, which diminished promptly under appropriate treatment, and the patient gained twenty-six pounds in weight within a few months. About a year and a half after the operation recurrence was noted at the site of the original neoplasm. This secondary growth gradually increased in extent and finally caused the patient's death on June 17, 1908.

This case was from the first an apparently forlorn hope, the operation at best offering only temporary relief from the dyspnoea and dysphagia with which the patient suffered, yet the result proved of sufficient value to justify the surgical attack. It has always been my belief, in case of any doubt as to the character of the neoplasm present or even the possibility of its radical removal, that if the condition of the patient will justify operation the aid of surgery should be invoked.

The question of diagnosis in doubtful cases must necessarily depend largely upon the experience and skill of the attendant. And while as a rule I would oppose the removal for examination of small portions of tissue from suspicious tumors, owing to the likelihood of thus causing the dissemination of malignant tissue elements, yet I believe under certain conditions such a step is

justifiable. This is especially true before the case shall have been declared hopeless and all possibility of surgical relief denied the patient.

According to Dr. Nicholas Senn, carcinoma of the parotid gland does not occur in persons under forty years of age, and the tumor grows rapidly and gives rise to early lymphatic infection. Weber described a form of malignant disease of the parotid that closely resembles a hard carcinoma of the mammary gland. Experience proves that a rapidly growing tumor of the parotid gland in a person of fifty or over is, with few exceptions, a carcinoma. The capsule of the gland is perforated during the early stages of the malignant process, and the overlying skin and neighboring organs become implicated. The external ear, the malar bone, the ascending ramus of the inferior maxilla, etc., are not infrequently involved. In two of the examples observed by Senn facial paralysis existed at the time operation was performed. Regional infection oftentimes extends to the deeper lymphatics of the neck.

Extirpation of the parotid gland was first performed in America by Warren in 1804. Brainard, of Chicago, performed the operation several times, and strongly maintained its feasibility. König advised in the aged partial excision of the gland, with the view to preventing facial paralysis provided the tumor was not large.

Senn, however, was of the opinion that partial removal of the parotid gland for carcinoma was an unjustifiable and unsurgical procedure, as recurrence is certain to take place and the recurrent tumor extends more rapidly than the primary growth. He believes that carcinoma of the parotid indicates complete removal of the gland with all other infected tissues, and states that the operation is always followed by permanent facial paralysis.

Contrary to the teachings of Senn and others, in neither of the examples which I have recorded did facial paralysis develop before or after the operation. I believe it possible in many cases for a careful operator to extirpate the parotid gland totally, as was done in the instances referred to in this paper, without inflicting serious injury to the facial nerve unless the neoplasm has already extended far beyond ordinary operative limits.

EPITHELIAL TUMORS OF THE EYELIDS

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THE epithelial tumors of the eyelids are of two kinds, namely, the squamous epithelioma and the rodent ulcer. These are the two principal malignant growths which occur in this situation, and as they are of considerable frequency, it is of high importance that they be early distinguished and treated according to their nature.

Although the squamous epithelioma has long been a well-defined entity as regards both clinical history and histological appearances, the rodent ulcer has remained more or less obscure, and for this reason that type of growth will be discussed here much more fully than the former. For a long time after the rodent ulcer was recognized as differing in many ways from epithelioma proper but little was known regarding its early stages, the clinical appearances being recognized mainly by the late stages, in which ghastly cavities were slowly formed in the face, gradually extending their boundaries at the expense of the surrounding tissues. The growth of these cavities was recognized as malignant, although there was very little tendency towards enlargement of glands or towards the appearance of constitutional disturbance. The histological appearances of the rodent ulcer were recognized as differing from those of squamous epithelioma in the middle of last century and the origin from the sebaceous glands was later established.

During some twelve years the writer has had opportunity of examining clinically and histologically 54 cases of epithelial tumors of the eyelids, which shows that the type of disease is not by any means uncommon. These cases were divided into two classes according to the histological appearances and without reference to the facts disclosed by the clinical history, namely: *Class 1*, in which the growth was found to be composed of irregular club-shaped masses of flattened epithelial cells bounded by columnar cells, and having a distinct origin from the skin in elongation of the inter-

papillary processes—squamous epithelioma; and *Class 2*, those cases in which the tumor was found to be growing under a layer of thinned skin and in which the growth was composed of irregular gland-shaped masses of oval epithelial cells of various sizes and shapes—glandular epithelioma or rodent ulcer. Of these tumors there were,—

Class 1	14
Class 2	40
	—
	54

AGE.—The average age of the subjects of the disease, at the date of operation, was,—

Class 1	65 years
Class 2	52 years
	—
Difference of age	13 years

The average duration of the growth at the time of the operation was,—

Class 1	6 months
Class 2	5 years

Subtracting now the duration from the average age of the subject, we arrive at the approximate age at which the growth begins,—

Class 1	64.5 years
Class 2	47.0 years
	—
Difference of	17.5 years

Thus, whilst it is true that epithelioma of the skin is a disease of advanced age, the glandular type occurs by preference in the prime of life whilst the squamous type occurs in the period of decadence. The youngest patient in whose case glandular epithelioma was found to be present was aged 24 years and the duration of the growth was 3 years. The age of the youngest subject of squamous epithelioma was 56 years and the growth had been present for about 4 months.

SEX.—Of the 54 patients the subject of epithelioma of the eyelids, 42 were males and the remaining 12 were women, subject to growths of the glandular type. It thus appears that the squamous type of growth is rare in women whilst the glandular type is less common in women than in men.

THE BEGINNING OF THE TUMOR.—In all the cases of squamous epithelioma in which a definite history could be obtained, the origin of the growth was stated to be a wart which had, in several cases, existed for many years before the change began. In the cases of glandular epithelioma the origin of the growth was stated to be a wart, a pimple, and in one case a white cystic growth (miliun). It is to be noted, in this connection, that a few cases have been seen by competent observers, as Dr. Reid, of Glasgow, in which squamous epithelioma has had its origin in the duct of a meibomian gland.

THE RATE OF GROWTH OF THE TUMOR.—It has been recognized for many years that there was considerable variation as regards the rapidity of growth of the epithelial tumors of the eyelids, and it has been stated that epithelioma grows as much in a month as rodent ulcer grows in a year. This fact is found to be true as regards the statistics put together here. In some cases the growth of rodent ulcer is exceedingly slow, as in the instance of a woman, aged 47, who had had a tumor excised 17 years before and found to be rodent ulcer after microscopical examination, and in whose case the recurrent growth, which began six months later, had, in 16½ years, attained a size of only 2.5 cm. (1 inch) in diameter. In another case, a woman, aged 71 years, an ulcer of the lower eyelid had been present for 15 years and had only attained 2 cm. (0.8 inches) in diameter, and had healed in places. In neither of these cases was there any doubt as to the diagnosis and in neither was there any involvement of glands. On the average it has been found that squamous epithelioma attains a diameter of 1 cm. (0.4 inch) in 5 or 6 months.

CLINICAL APPEARANCES.—Squamous epithelioma generally ulcerates rather early, the usual history given being that a scab formed and was picked off. When of a few months' duration only, the ulcer of this type is usually found to have thickened edges and a smooth floor which gives rise to a small quantity of discharge

only. Although as a rule no pain is experienced, occasionally complaint is made of a "stinging sensation." Glandular epithelioma does not ulcerate until it is a year or so old as a rule. In its early stages it presents the appearances of a flattened or dome-shaped tumor *growing under the skin* and forming a smooth elevation of pale purple color with rounded margins. The mass is hard to the sense of touch and the skin is manifestly stretched over it and thinned though still movable over the growth. When ulceration has taken place, the edges are usually thin, clean-cut and overhanging, "rolled over" as it is often called. The floor of the ulcer is usually smooth and flat and gives rise to a small amount of sanious discharge only.

It is occasionally found that the edges of the ulcer of this type are thick and pointing and sometimes the growth itself projects and forms a large external tumor, but this is very rare.

RECURRENCE AND CACHEXIA.—As shown before, the glandular type of growth may exist for many years without involving the lymphatic glands or producing any effect upon the general health, whereas the squamous type of growth readily involves the lymphatics and produces cachexia.

POSITION OF THE GROWTH.—Both types of growth occur more frequently in the lower than in the upper eyelid and, by preference, at the extremity of the lid. This latter fact is less marked in the case of the glandular than in the squamous type.

HISTOLOGICAL CHARACTERS.—The structure of the two growths is generally quite characteristic in so far as both the shape and mode of disposal of the cells is concerned. In the *squamous type* the growth is composed entirely of flattened compressed epithelial cells which show a fairly well-marked tendency to become desiccated.

These cells are arranged in columns which are usually constricted at some point and which sometimes branch at the deep extremity, forming side processes and nodules. The margins of the processes are usually well defined and are lined by cells arranged in a more or less regularly columnar manner. In the processes or nodules of this type of tumor are often found spherical or ovate masses of tightly packed desiccated cells surrounded by concentric layers of epithelial cells in a less advanced stage of desiccation.

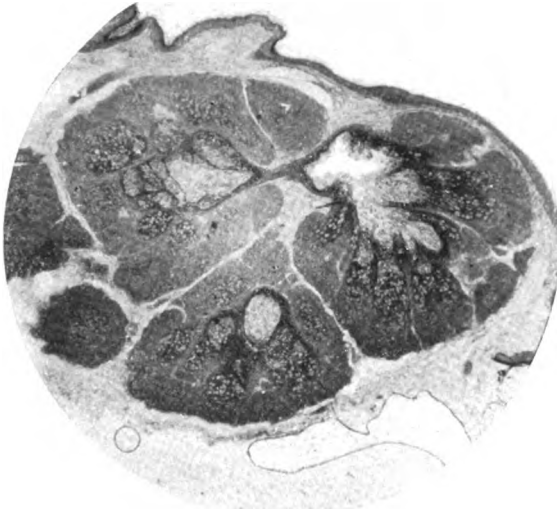
These laminated capsules or cell-nests are considered by many to be almost characteristic of epithelioma of the squamous type, but they may be found in the rodent ulcer type of growth also. They may be of service in helping to distinguish between the epithelioma and similarly formed masses which are not malignant.

The advancing edge of the squamous epithelial tumor is usually found to be composed of increasing elongation of interpapillary processes of the skin. In the case of a simple wart which is undergoing malignant transformation, the first indication of change of type is usually found to be increase of thickness of the Malpighian layer of the interpapillary processes at the edge of the mass. The subjacent and surrounding tissues, in the case of squamous epithelioma, are usually found to be infiltrated to a marked extent by lymphocytes, there being frequently congregated into them groups like abscess formations. Other types of leucocytes are not commonly found. When the tumor has ulcerated, the floor of the ulcer is found to be composed of the eroded and exposed ends of epithelial columns, surrounded by inflammatory tissue which is generally very vascular. In the *glandular type* of growth the histological appearances are found to vary considerably according to the duration of part observed.

The earliest manifestation of tumor growth of this type was undoubtedly found in connection with a sebaceous gland. This consisted of a thickening of a portion of the gland which was converted into an almost solid mass of oval epithelial cells. A few small cavities were found in this mass filled with a yellowish-colored granular material which seemed to be partly sebaceous and partly degenerated epithelial cells (Fig. 1).

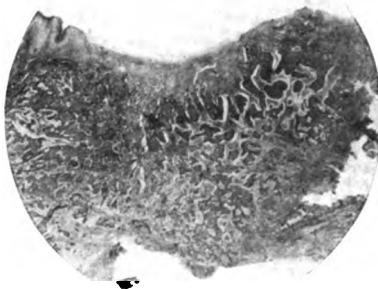
In less recent growths the tumor was found to be composed of ovoid or spherical masses of oval cells with, here and there, small cavities in them similar in all respects to those above mentioned. In this stage the growth evidently represents thickening of the entire gland, which has, of course, been increased very considerably in bulk, and the cavities evidently represent the sacs of the normal gland. The mass very soon becomes solid by encroachment of the growth upon the cavities and we then find masses composed of oval cells, sometimes containing imperfectly formed laminated capsules and surrounded by a layer of columnar cells and a distinct basement

FIG. 1.



Glandular epithelioma; early stage, showing enlargement of sebaceous gland. ($\times 8$.)

FIG. 2.



Glandular epithelioma; ulcerative stage, showing the fibrous floor of the ulcer, and the tumor tissue broken up by bands of fibrous tissue. ($\times 6$.)

Fig. 1

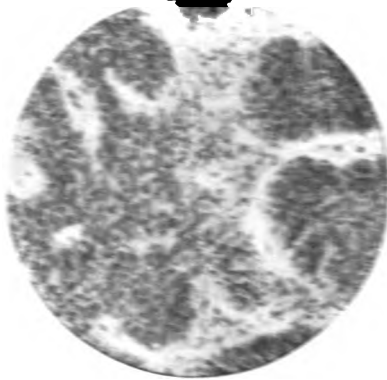


Fig. 1. The image shows the central part of the field of view of the telescope.

Fig. 2

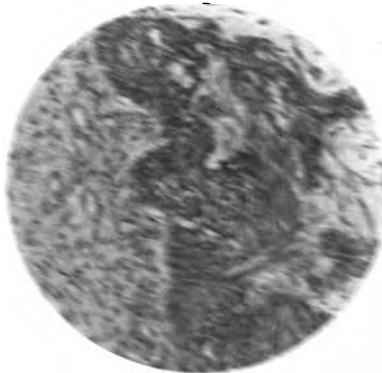


Fig. 2. The image shows the central part of the field of view of the telescope.

membrane. The tissue in which these masses of epithelial tissue are lying is usually fibrocellular in character, and as a rule, there is much less cell infiltration than in the squamous type of growth. The masses have no distinct connection with the overlying skin, unless one happens to make a section through the hair follicle to which the gland is attached. The skin is thinned and the papillæ and interpapillary processes are smaller than usual.

Before going on to describe those changes which take place in the masses of epithelial tissue and give rise to the peculiar characteristics of the clinical history of rodent ulcer, we shall take up the appearances of the ulcer which forms in connection with it. The edges of the ulcer are composed of skin with a layer of fibrous tissue, often of great density and considerable thickness, developed under it. The skin has the appearance of being atrophic in most cases, but sometimes a slight degree of elongation of the interpapillary processes is seen. The floor of the ulcer is composed of fibrocellular tissue which is often found to be undergoing some form of degeneration as a result of exposure. It may even be so highly infiltrated by inflammatory tissue as to be like a pyogenic membrane. Below this layer of fibrous tissue a layer of fibrocellular tissue extends for a considerable depth into the tissue of the lid and in this are found embedded the masses of epithelial tissue which constitute the tumor proper (Fig. 2). These masses are usually at this stage irregularly shaped, distorted, and, as it were, broken up into fragments by the action of the process now to be described.

Briefly stated, this process consists of infiltration of the tumor tissue by fibrous tissue, and as the advance is more rapid at some parts than at others the result is that the epithelial masses are cut into pieces by bands of the newly formed fibrous tissue and drawn and distorted so that the structure bears little resemblance to the original mass. The first visible change is found in the appearance of small, angular, sharply defined cells growing apparently in connection with the basement membrane of the epithelial masses and projecting from it into the interstices between the columnar cells which form the margin of the growth. From this primary position the invading tissue generally advances into the interior of the tumor tissue, spreading out in such a manner that all parts of the mass are infiltrated by it (Fig. 3).

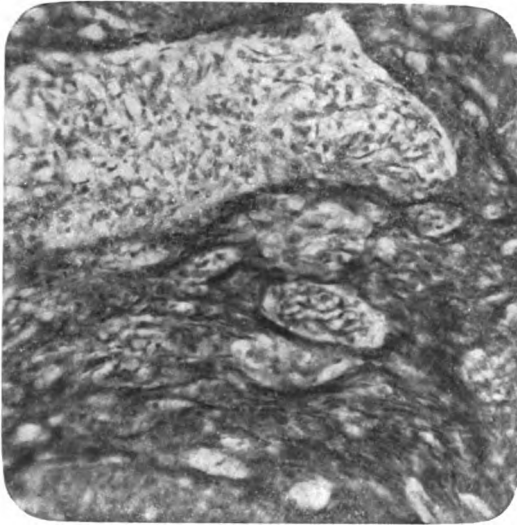
As the growth of this connective tissue extends in the epithelial tissue, bands of it are formed passing in various directions, dividing the original mass into lobes and lobules. Whilst this is going on inside the epithelial structures changes are also taking place round the outside, for, owing to the existence of continuity of tissue between the basement membrane and the connective tissue surrounding it, those parts of the basement membrane at which the new-formed tissue is most plentifully developed gradually lose their identity as membrane, being merged into the surrounding fibrous tissue and becoming part of it. The result is that there is at such parts a direct continuity of tissue from between the fibrocellular matrix and the connective tissue in the tumor (Fig. 4).

As several of such inroads may be going on at different portions of an epithelial mass, what was formerly solid becomes like a branched gland formation, and ultimately the branches, as it were, become cut off here and there, the band of fibrous tissue being connected at both extremities with the fibrocellular matrix. In this manner the change goes on, the small lobes of epithelial tissue being broken up by further inroads and by withdrawal of cells from it by traction into the surrounding tissue (Fig. 5).

The ultimate result of this process is that the masses of epithelial tissue are ultimately more or less completely replaced by fibrous tissue. So great, indeed, is the change and so completely is the epithelial tissue removed that sometimes a tumor ulcer excised as a rodent ulcer is found to be composed of a dense mass of fibrous tissue in which only a careful examination will reveal the existence of a few small masses of epithelial tissue deep down. It is on account of this peculiarity that recurrences are so frequent after excision of such a growth, for as a rule the surgeon cuts only a trifle beyond the hard base which in this case may not be far enough. It is not difficult to see in this transformation the reason why a rodent ulcer may heal at one place whilst advancing at another, or even why it may appear to heal entirely for a month or two and then break out again. The nature of the tissue readily explains the peculiarities of the clinical history (Fig. 6).

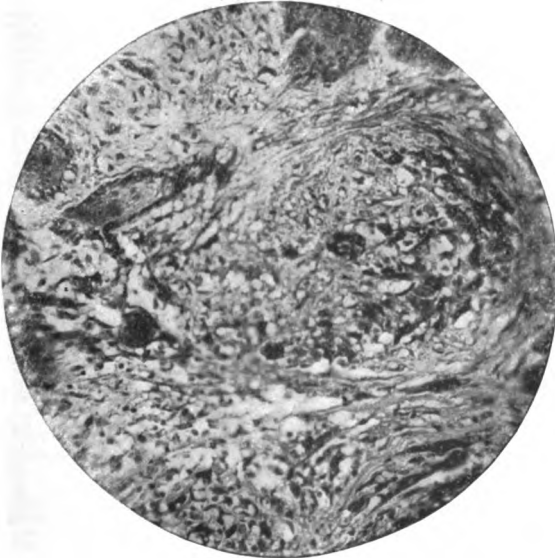
The precise origin of the cells which appear to grow from the basement membrane is not yet clear. Their growth from the basement membrane itself suggests a connective-tissue source and the

FIG. 5.



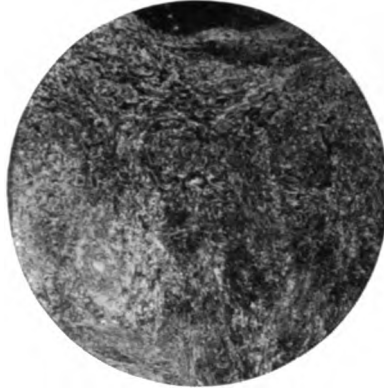
Glandular epithelioma ; later stage, tumor tissue largely replaced by fibrous tissue. (\times 150.)

FIG. 6.



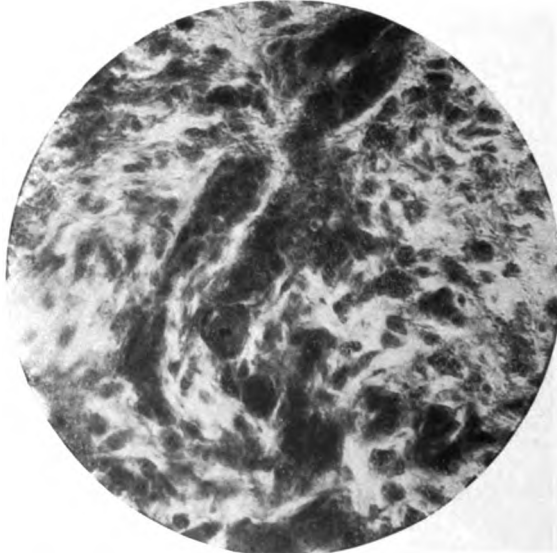
Glandular epithelioma ; nodule of tumor tissue almost entirely replaced by fibrous tissue. (\times 200.)

FIG. 7.



Squamous epithelioma after prolonged treatment by X-rays, showing formation of fibrous tissue. (· 10.)

FIG. 8.



Squamous epithelioma : small islet of epitheliomatous tissue remaining amongst fibrocellular tissue deep in the tumor.

mode of extension both amongst the epithelial cells and in bands between masses of tumor tissue shows that it is closely allied to the fibrocellular matrix in which the tumor is growing. It is interesting to note here that squamous epithelioma which has been treated for a prolonged period by use of the X-rays seems to behave in a manner similar to rodent ulcer, and the histological examination of the former shows that it has become much like the latter. Here again it is possible to explain why, after such prolonged treatment of a squamous epithelioma, apparent benefit is followed by recurrence. The fibrous tissue overgrowth masks the presence of a few little nodules of epithelial tissue which are the starting point of renewed activity (Figs. 7 and 8).

Regarding the presence of the peculiar connective-tissue element in rodent ulcer it may be said that Dr. Thomas Reid, of Glasgow, has for many years been working out the origin and development of a precisely similar element in the normal skin and conjunctiva. Reference to a paper published by Dr. Reid in the Royal Academy of Medicine of Turin (April 22, 1904) will show that these elements are to all intents and purposes identical with those which appear to exercise so important an influence upon the growth and development of the tumor in cases of rodent ulcer or glandular epithelioma. The result of examination of skin and conjunctiva at various stages of development in animals of diverse kinds and in man has shown the author of the paper that there is present as a constant factor, better developed in some cases than in others it is true, a connective-tissue element which seems to develop from the basement membrane below and also from the granular layer above and which possibly forms a sort of sustentacular framework in the interstices of which the epithelial cells grow. It is, then, to hypertrophy of this supporting tissue and the formation of fibrous tissue as a result that the peculiar characters of the clinical history of the semi-malignant glandular tumor are due.

TREATMENT.—The treatment of squamous epithelioma requires no notice here and only a word is necessary regarding glandular epithelioma. Deep and thorough excision is the only satisfactory method of treatment and the earlier it is done the better. In cases where this cannot be carried out the use of *formalin* in an ointment (10 per cent.), applied twice daily, will often assist in clearing the

cavity better than any other method on account of the great power of penetration which this drug exhibits.

In one or two cases the continued use of such an ointment has given rise to so marked diminution of the ulcer as almost to constitute a cure, and small secondary nodules recurring along the line of an excision with a plastic operation have entirely disappeared. The treatment is not painful, but chronic irritation is set up which seems to augment the natural tendency to cicatrization exhibited by the tumor itself.

Surgery

REPORT OF SATURDAY SURGICAL CLINICS FOR STUDENTS, HELD AT GERMAN HOSPITAL OF PHILA., 1908 AND 1909

BY JOHN B. DEAVER, M.D., LL.D.

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DURING the 26 clinics there were 234 patients operated upon. The case-histories of 194, representing the most interesting cases, chiefly abdominal, will be analyzed and commented upon in this paper. The remaining 40 cases, which cover a variety of lesions in general surgery, will not be considered.

ACUTE APPENDICITIS

There were 100 cases of appendicitis, of which 35 were acute. Of the patients with acute appendicitis, 19 were males and 16 females. Fifteen were still in their teens, while 20 were between the ages of 20 and 50. Twenty-one were operated upon in their first attack, 11 in the second, 2 in the third, and 1 in the fifth. Ten were admitted within twenty-four hours of the inception of the attack, the remaining 25 following in from one day to four weeks. In 26 the initial pain was followed by nausea or vomiting and in 8 by neither nausea nor vomiting, while one patient vomited before the pain. Nine offered a history of constipation and one of diarrhoea. Indigestion was complained of by 4 of the 14 patients who had had previous attacks. I think closer questioning would surely have revealed indigestion in more of these patients. Only one patient complained of rigors, the cause of which was toxic absorption from pus in the pelvis. One patient suffered from vesical tenesmus and pain on defecation, due to the appendix running over the brim of the true pelvis and giving rise to an abscess there.

Locally, the muscular phenomena were described as resistance, spasm, or rigidity of variable extent. An area of tympany

corresponding to a distention of the cæcum with gas was frequent, but often a mass was palpable which proved to be an abscess or a mass of inflammatory tissue. Tenderness or soreness were usually found, chiefly in the right iliac region, but often wider in extent. Tenderness here does not invariably mean appendicitis, for it is frequently a nervous phenomenon, and at other times is due to cæcal constipation. Thirteen cases were "clean," the pathology being confined within the appendix, and thus presented neither regional abscess nor exudate. Thirteen cases showed exudate, either serous or fibrinous, outside of the appendix, while 9 cases had extra-appendiceal abscesses. Early diffuse peritonitis was present in 2 patients, with no ill effects. Late diffuse peritonitis with the distressing phenomena of advanced toxæmia was responsible for the 2 fatal cases in this series. These two patients were admitted, one on the third, and the other on the seventh day after the onset of the attack. The patient admitted on the seventh day was brought down from up state. It is not improbable that when he began his journey there was a localized abscess, and that this had ruptured during transportation, for 2 abscesses were found, one pelvic, the other subphrenic, with rupture into the right lung. Pus was found in the pelvis in 5 patients; serosanguinous fluid in 4, and serofibrinous in 1. The appendicitis was reported acute ulcerative in type in 12; suppurative in 1; gangrenous in 8; perforative in 2; and an acute exacerbation of a chronic process in 9, all of whom gave histories of previous attacks except one. The appendix was partly or wholly sloughed away in 3 cases, in one of which the tip had separated, in another of these the appendix had separated into halves, while in the third the appendix was found in stool the night after operation, it not having been disturbed at that time because of a dense fibrinous barrier. Bacteriological returns from 12 cases were sterile in 4; showed *B. coli* in 6, in several of which the characteristic foul pus was liberated at operation, and *B. coli* with *Staphylococcus aureus* in 1 and *Streptococcus pyogenes* in addition to these two organisms in 1. The leucocyte counts exhibited the usual pyometric changes, and it was interesting to watch them fall in patients under expectant treatment for localizing abscess.

Finally, as to the incision, this was planned with regard to the

presence or absence of exudate or of adhesions, determined as far as possible by the history and preoperative findings. Thus, the McBurney incision—the one of choice—was used in 10 cases, in only 3 of which was enlargement necessary. In 20 the incision was through the right rectus muscle. In the remaining 5 the incision was directed beyond the right rectus, so as to approach abscesses extraperitoneally. In one of these there was no abscess, but the appendix was retrocaecal, so it proved the best method of approach. In most of the cases in which the McBurney incision was used the stump of the appendix could readily be buried in the cæcum, but in most of the rectus incisions it was not buried, owing to the presence of regional exudate (see Fig. 1).

One of the patients presented, in addition, a large right-sided ovarian cyst. Another was re-opened 2 days after operation for intestinal obstruction, which disappeared after removal of a cigarette drain.

CHRONIC APPENDICITIS

There were 65 cases of chronic appendicitis. Upon 6 of these other lesser operations, as repair of inguinal hernia in 2, trachelorrhaphy, dilatation and curettement of cervix, dilatation of cervix, and excision of *fistula in ano* were performed. In 13 others, the chronic appendicitis was so overshadowed by other more serious lesions that their analysis as cases of chronic appendicitis would be of little value. In this group there was 1 case of cholecystitis, 1 of chronic pancreatitis, 1 of pelvic hydronephrosis in a horse-shoe kidney, 3 of hernia—incisional, inguinal, and pudenal, 3 of fibroid uterus, 1 of carcinoma uteri, 1 of acute salpingitis, and 2 of chronic salpingo-oöphoritis. In all of these 13 cases the appendix was proven chronically inflamed by microscopic examination, although in various other conditions the appendix was incidentally removed for prophylaxis, the pathological reports returning “minor lesions.”

Confining our attention, then, to the 52 cases in which chronic appendicitis was the predominant feature, we find that, as is usual in chronic cases, the majority, or 27, occurred in females. Most of the acute cases were found as usual, in the second decade of life, in the chronic cases most, as anticipated, were in the third decade of life, there being twenty-two between the ages of 20 and 30, four-

teen from 10 to 20, thirteen from 30 to 40, two from 40 to 50, and one just over 50. The longest appendiceal history was 10 years, and the shortest 3 weeks.

Of 37 cases in which the number of attacks was definitely stated, twelve had 1, seventeen had 2, four had 3, three had 5, and one had 6. The remaining 28 patients had suffered from long-continued intestinal indigestion, or complained of constant soreness, of twinges of pain, or of rumbling in the right iliac region. Such cases, in which there is no outspoken attack, probably signify latent appendicitis. Cases of acute appendicitis in which the patient can recall no previous attack but in which the pathological diagnosis is chronic appendicitis with acute exacerbation doubtless belong in this category.

The symptoms complained of were gastric dyspepsia in 6 cases, intestinal indigestion in 7, constipation in 14, diarrhoea in 2, nausea in 7, vomiting in 19, and pain, which began in and remained in the right iliac region in 29, and began in the epigastrium, spread throughout the abdomen, and became localized in the right iliac region in 12. Five complained of pain after coughing or moving about—a significant sign of peritonitis, which may be elicited in the reclining patient by having him take a deep breath. Tenderness in the right iliac region was present in 44. In the absence of vomiting, nausea is a symptom of almost equal significance, seeing that in either case the cause is reflex, and it is only a question of the degree of reflex irritation whether nausea or vomiting is present. In the same way, prolonged and repeated vomiting is significant of much mischief in the abdomen. Vesical symptoms were present in 3, and testicular nausea in 1.

The McBurney incision was used in all cases except 8, in which the short right rectus incision was made. Adhesions were found in 11 cases. Microscopical examination showed that the appendicitis was chronic interstitial in 34 and chronic obliterative in 3. In 13 inconspicuous lesions were present.

CHOLELITHIASIS

There were 13 cases of cholelithiasis, 4 in males and 9 in females. The youngest patient was 22 and the oldest 75 years of age. All of these recovered.

Enteric fever preceded the cholelithiasis in 2 cases, by 1 year in 1, and by 3 in the other. The initial symptom of gall-stone dyspepsia was clearly present in 7 patients. After a more or less protracted siege of gall-stone dyspepsia, the acute attacks themselves began with sudden excruciating pain in right epigastrium in all the patients, and in 7 the pain radiated elsewhere. Nausea or vomiting or both ensued in 8 cases, with chills and sweats in 4, jaundice in 10, and clay-colored stools in 5, of which 4 were examples of common duct lithiasis. Jaundice was severe enough to cause intense itching in 1 case. This classical symptom-complex of gall-stone disease manifested itself in complete form almost exclusively in the cases of common duct lithiasis. One or more symptoms, the only constant one of which was sudden excruciating pain in the right epigastrium, were found in the cases of lithiasis of the gall-bladder or its duct. Diagnosis of frank lithiasis of the gall-bladder, therefore, must often be based upon a history of protracted dyspepsia and numerous attacks of sudden, excruciating epigastric pain. Diagnosis of latent lithiasis is conjectural and serves no practical purpose because the patient is free from annoyance aside, perhaps, from an occasional dyspeptic attack. Diagnosis of lithiasis of the bile-ducts, however, is much more readily made, because based on pronounced symptoms caused by the unwelcome presence of the stones in the ducts. Jaundice was claimed to have been present by 10 patients, but discount must be allowed for many patients who mistake a sallow complexion for jaundice. So, too, they may be unable to distinguish between normal light stools and clay-colored stools. Tenderness at the site of the fundus of the gall-bladder, just internal to the tip of the ninth costal cartilage, was found in all but 2 patients, and the gall-bladder was palpable in 1.

Calculi were present in the gall-bladder alone in 5 cases, there being as few as 3, 4, and 5, and as many as 90 and 111. In 2 of these cases the common duct, while free from stones, was dilated and thickened, in 1 of which it traversed the head of a chronically inflamed pancreas. Calculi were present in the cystic duct alone in 2 cases, in one of which there were 2 the size of grape seeds while the gall-bladder contained thick bile, and in the other there were 3 mulberry stones, while the gall-bladder was the seat of

distention (Fig. 2). The two small stones, however, caused far severer symptoms than the three impacted mulberry stones. Calculi were present in the gall-bladder and common-duct in 2 cases, in one of which there was 1 rounded stone in a thickened, contracted, and adherent gall-bladder, and 2 at the distal end of a common duct dilated to the size of a thumb, while in the other the gall-bladder contained 25 stones and the common duct 7. Calculi were present in the common duct alone in 3 cases, 2 of which contained one stone each and the third 2 stones, one of which was impacted in the ampulla of Vater. Courvoisier's law obtained in 2 of these cases, in both of which there was marked, though intermittent, jaundice with contracted gall-bladder, while the other case showed jaundice with a dilated gall-bladder.

Calculi were present in the common and hepatic ducts in one case. There were 2 in the hepatic duct and 3 in the common. This patient was 75 years old and had chronic infection of the biliary system which recurred 3 times, for he had been operated upon twice previously, once in 1903 when 2 stones were removed from the common duct, and again in 1905, when the gall-bladder was the seat of empyema. The infection was also manifested by chills and sweats and *B. coli* was recovered. At this latest operation the gall-bladder was masked by such dense adhesions that it was not disturbed. It is in such a case as this that malignant changes are liable to supervene.

Sufficient drainage was arranged to meet the indications present. Thus, for a case in which the gall-bladder was but slightly inflamed and contained thin bile tube drainage in the gall-bladder sufficed. Cases of very extensive infection required drainage not only in and about the gall-bladder, including the subhepatic space, but also into the hepatic through the common duct. Despite these precautions, one patient had to have a subphrenic abscess evacuated the fifth day after operation.

The gall-bladder was removed in 2 cases. One was the seat of hydrops, due to 3 mulberry stones blocking the cystic duct. In both the mucosa was hemorrhagic, showing an acute exacerbation of a chronic process. Microscopic examination in one of the latter two showed adenocarcinoma (Fig. 3).

Cholecystoduodenostomy was performed in the patient whose hard and enlarged pancreas showed chronic pancreatitis. In this



FIG. 1.

Acute appendicitis of two days' duration, about to rupture. Note great distention proximally, and subserous cyst distally. (Natural size.)



FIG. 2.

Hydrops of gall-bladder. Window made in neck to show impacted stone. (Natural size.)

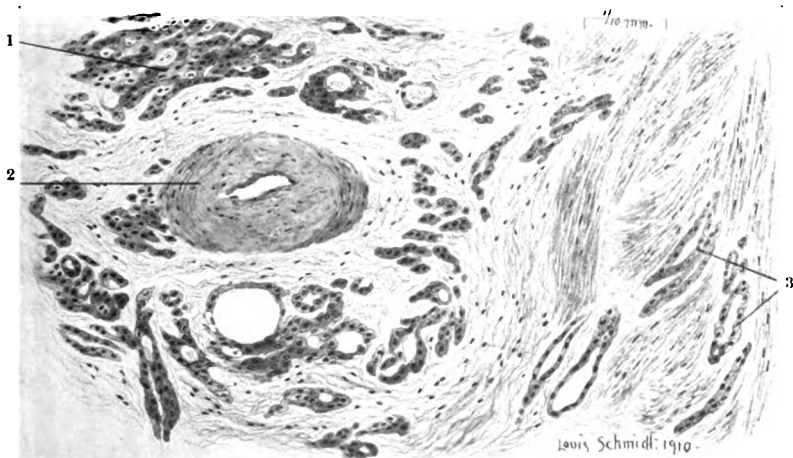


FIG. 3.

Microscopical appearance of adenocarcinoma of the gall-bladder, from a patient aged 36. 1. Cancer cells in submucosa. 2. Arteriole. 3. Cancer acini between muscle-bundles.

case, be it recalled, the common duct was thick and rigid, and penetrated the head of the pancreas. There had been gradually deepening jaundice of 2 weeks' duration. The Cammidge test was negative.

B. coli was recovered in 7 cases, including both patients who had had enteric fever. The Cammidge test was negative in 2 patients, one of whom had lithiasis of the gall-bladder and chronic pancreatitis, while the other had lithiasis of the common duct. On the other hand, it was positive in a case of lithiasis of the common duct. The highest degree of anæmia was 59 per cent., with 3,940,000 red cells, and leucocytosis was 16,600. For the most part, however, the amount of hæmoglobin and numbers of red and white cells varied but little from normal. The coagulation tests and those for bile in the stool proved so erratic as to be of little or no practical value.

CHOLECYSTITIS

In addition to those associated with cholelithiasis, there were 3 cases of simple chronic cholecystitis, one of which had also chronic interstitial appendicitis.

One, a male aged 28, had had enteric fever 8 years previously, and had been a heavy drinker up to 3 years ago. He was irregular at meals and bolted his food. For the past 2 years he has had pain in the upper abdomen, relieved by the ingestion of food, which food frequently caused immediate vomiting and urgent desire for stool. Otherwise he was constipated. There was epigastric tenderness. Occult blood was found both in gastric contents and in stool. Operation revealed the omentum adherent to the parietes and to the gall-bladder, which was distended with thick, very dark green bile. There were also filmy adhesions between the gall-bladder, pylorus, duodenum, and adjacent structures. The gall-bladder was drained by a tube with gauze and dam, which emerged through a counter-opening more externally. Culture was sterile.

Another male, aged 41, had been suffering for a year from burning pain in epigastrium, worse on standing and bending forward, and radiating to back and shoulder. He did not suffer from indigestion but was very constipated. For the past three years he had been jaundiced. Slight tenderness was present below the right costal margin and in the epigastrium. The conjunctivæ were

distinctly yellow. The gall-bladder was slightly enlarged and thickened, and contained dark, thick bile. Drainage consisted of a tube which was reinforced by gauze surrounded by rubber dam. Stomach contents were normal and culture was sterile.

The third patient was a female, aged 22, who had two months previously an attack of cramps about the liver, with jaundice, which became intense. The jaundice gradually cleared away, but the pain about the liver recurred several times. Slight rigidity in the right upper quadrant was present, and tenderness over the gall-bladder was quite marked. The enlarged, thickened, congested gall-bladder was drained of dark green, very thick bile by a tube, gauze, and dam. Culture was sterile. The appendix was removed.

PERITONITIS

In addition to the cases of secondary involvement of the peritoneum which occurred from primary appendicitis or primary gall-bladder disease there were six instances of three forms of peritonitis. Two of these were of that severe type of purulent peritonitis known as subdiaphragmatic abscess, both in males and both fatal. One, aged 33, had been operated upon a year previously for acute appendicitis, and was drained. His present illness began six weeks previously with severe epigastric cramps which left soreness, and which were remotely followed by vomiting. He was very constipated. There was marked rigidity in the epigastrium and left hypochondrium, and moderate distention. Under the left costal margin a somewhat tender and immovable mass was present. Just previous to operation the hæmoglobin was 58 per cent., reds 3,380,000, and whites 18,360. At operation an abscess containing gas was evacuated from beneath the liver and drained. Like so many other cases of this sort the patient became septic and extremely nervous, developed severe cough with foul, purulent expectoration, and died from exhaustion. *Staphylococcus aureus* was recovered from the pus. The other patient developed right-sided empyema within a month after discharge from hospital. This infection spread through the diaphragm, and by resection of the ninth rib and incision through adherent pleura and diaphragm, 250 c.c. (8 ounces) of foul, thick, creamy pus were evacuated from below that muscle. At autopsy an abscess of similar capacity was found in the adjacent part of the liver.

There were three cases of chronic peritonitis which produced abdominal adhesions. One patient, a woman aged 44, had been operated upon three months previously for chronic cholecystitis and pericholecystitis. The pains about the scar of which she complained were relieved when adhesions between the omentum and parietes were dissevered. The gall-bladder was in good condition. The second patient was a male, aged 24, who had been operated upon three times previously. The first operation was two and a half years ago, when the appendix was removed without drainage. The second operation was eighteen months later, following a period of abdominal cramps with attacks of nausea and vomiting. Adhesions between the omentum and parietes were dissevered. The third operation was performed three months later, when adhesions were again dissevered. Following this, repeated and frequent attacks of pain and vomiting and persistent constipation called for the present operation, at which adhesions between the omentum and parietes were again dissevered. The third patient, a female aged 35, had been operated upon elsewhere four years previously for cholelithiasis. For the past three weeks she has complained of persistent vomiting, with loss of weight from inanition. The Cammidge test was negative. Operation disclosed adhesions which bound the omentum and duodenum so firmly to the liver that they were not disturbed, but posterior gastro-enterostomy was performed.

The sixth case of peritonitis was of the chronic tuberculous variety, and occurred in a female, aged 24, who for nine months had had amenorrhoea, and for six months progressive loss of appetite and of strength, abdominal cramps, and irregularity of bowels. On the day of admission she had sudden acute abdominal pain with vomiting, and the abdomen was distended and universally tender. At operation, clear straw-colored ascitic fluid escaped, and miliary tubercles were sprinkled throughout the peritoneum. Drained by a glass tube in pelvis. Culture sterile. The leucocytes fell from 10,350 at time of operation to 5200, or 50 per cent. less, seventeen days later.

DUODENAL ULCER

There were 2 cases of duodenal ulcer, both in males. One, aged 35, had suffered during the past 3½ years from 5 attacks of sudden, sharp pain localized low in right hypochondrium, usually with

nausea and vomiting and followed by soreness. No pain ensued upon ingestion of food, nor was there any hunger pain. During this time he lost 19 pounds. Tenderness was present to the right of and somewhat above the navel, and also under the right costal margin. At operation there was found in the duodenum 1 cm. (0.4 inches) from the pylorus a chronic ulcer. Pylorotomy, including 10 cm. (4 inches) of the stomach and 3.5 cm. (1.4 inches) of the duodenum, was performed, and was followed by posterior gastro-enterostomy. The other patient, aged 36, had passed two renal calculi nine years previously. Since three and one-half years he has had mild attacks of pain in upper abdomen, and much nausea one-half to one hour after eating, relief from which is afforded by voluntary vomiting. He suffered much from gas on the stomach, and required carefully selected diet. Both of these patients were constipated. Tenderness was present in the right upper part of the abdomen. At operation the gall-bladder was thickened, somewhat enlarged, and surrounded by a few adhesions. An ulcer was found on the anterior wall of the second portion of the duodenum, and posterior gastro-enterostomy was performed.

CHRONIC PANCREATITIS

There were 2 cases of chronic pancreatitis, both of which have been referred to, since one was associated with chronic appendicitis and the other with cholelithiasis. One was a male, aged 35, who has had during the past three years numerous attacks of non-radiating cramps, which came on usually in the early morning, and which bore no relation to ingestion of food. They were accompanied by pressure and weight sensations high in the epigastrium where, likewise, the cramps were situated. There were also hiccupping and belching, and vomiting as often as 20 to 30 times daily. He was somewhat constipated. The duration of each attack was 5 to 8 days. The abdomen was slightly distended, and tenderness was elicited in the epigastrium. Fat globules and numerous soap crystals were found in the stools. The Cammidge test was negative. At operation the pancreas was hard and somewhat nodular; the omentum was adherent to the parietes and gall-bladder, and filmy adhesions bound the pylorus to the gall-bladder. Cholecystoduodenostomy was performed and a chronically inflamed

appendix removed. The other patient, a female aged 53, suffered from chronic pancreatitis associated with gall-stone disease. The pancreas, especially its head, was very hard and somewhat enlarged, and was traversed by a thickened and rigid common duct. The Cammidge test was negative. In addition to cholecystoduodenostomy, the common duct was drained by a tube.

FECAL FISTULA

A girl, aged 14, had been operated upon three months previously for acute appendicitis with abscess. Fecal fistula developed a week before discharge from the hospital, but her general condition being good, she was sent to the seacoast for convalescence. At operation the fistula was dissected down to the cæcum and excised. Its stump was invaginated into the cæcum and held by a purse-string suture, and the serosa was approximated over the stump.

HERNIA

There were 8 cases of inguinal hernia, of which 3 were associated with chronic appendicitis and one with a small umbilical hernia. Seven occurred in males, 4 were right-sided, 3 left-sided, and one bilateral. The duration varied from six months to fourteen years. One was ruptured by heavy lifting. Trusses were worn by 3. One patient was treated by 10 injections of some sort, and believed the hernia to be smaller. Bassini's operation was undertaken in all of this series of cases. In one, the hernial sac contained the bladder.

The one case of umbilical hernia occurred in a female, aged 38, and was associated with right-sided inguinal hernia. It was very small, the opening admitting the little finger only, but caused considerable dragging pain. It was cured by the Mayo operation.

There were 6 cases of incisional hernia, 3 of which followed abdominal section for acute appendicitis, 2 for salpingo-oöphoritis, one for Cæsarian section. The three patients who had been operated upon for appendicitis were males, in one of whom the wrecked appendix still remained. The sixth patient had been operated upon twice for Cæsarean section, and between the operations gave birth to a normal child. The first section was 18 and the second 16 years previously: at the latter both ovaries were removed. The

three pregnancies and the two sections had impaired the strength of the abdominal wall to such an extent that hernia followed the second section. It was not until strangulation occurred, two days before operation, that the patient sought relief. At that time the hernia descended and became irreducible, and caused vomiting, soon becoming fecal, and intestinal obstruction. At operation a loop of gut was released from its strangulating environment, and recovered under hot applications. Extraordinarily aseptic precautions must be observed in cases of this character lest the wound break down. Repair of incisional hernia was also performed in a patient the nature of whose previous operation is, however, unknown.

There was one case of pudendal hernia, which occurred in a patient, aged 33, who, when in the eighth month of her third pregnancy, became aware of bearing-down pain in right side of vagina, where a small lump was noticed. Examination showed that the right labium was symmetrically distended by a soft, walnut-sized mass which became larger on standing or coughing, but disappeared on pressure. Neither gurgling nor a distinct impulse could be felt. Incision was made through the outer margin of the right labium, parallel to the vaginal axis and external to the erectile tissue of the labium; the tissues were then matched and apposed with chromicized catgut sutures.

GENITO-URINARY DISEASES

Perinephric abscess, described here for convenience, occurred in a female, aged 36, who had had enteric fever and pneumonia seven years previously, and an operation for hemorrhoids one year later. Three weeks ago she complained of fever, and of pain in right lumbar region which became severe and cutting but did not radiate. This pain has been intermittent, but there is constantly a dull pain there. Appetite good; no vomiting. Hæmoglobin 54 per cent.; white cells 17,800. Much tenderness was elicited over the loin space. A considerable quantity of pus was evacuated from about the kidney.

Pyonephrosis was present in 2 cases, and tuberculosis in one. The non-tuberculous patient was a male, aged 28, who two months ago complained of dull, aching pain in the left loin, becom-

ing worse three weeks later, since which time it has been intermittent, and of a griping, gnawing character; never sharp or cutting and never radiating toward the bladder. No urinary disturbances. A month ago the temperature rose to 104° , and has been fluctuating since then. During this time the patient lost weight. Much resistance and tenderness were felt about left kidney. Cystoscope showed that both kidneys were functioning. Hæmoglobin 72 per cent.; white cells 15,100. At operation, after penetrating through dense adhesions, a small, necrotic, pyonephrotic kidney was found and removed. Culture showed *B. coli*. The tuberculous patient was a female, aged 19, whose symptoms began insidiously as usual a year before with inability to retain urine. Three months later there began pain near the bladder, relieved by urinating. Voluntary control of micturition was later restored. The right kidney was palpable and tender. Cystoscope showed red blood cells and pus descending the right ureter. Leucocytes 8200. The kidney and several inches of the ureter were removed, and a drainage tube placed from the stump of the ureter to the upper angle of the wound. There were numerous adhesions about the kidney, and on section the calyces and entire parenchyma were riddled with abscess cavities containing thick, creamy pus.

Congenital horseshoe kidney was found in an Italian, aged 22, during the removal of a chronically diseased appendix. It extended across the spine with its convexity downward, and had two ureters. The pelvis of the right ureter was dilated to the size of a hen's egg. It was opened and an oval piece excised, but no obstruction was found in the ureter. This anomaly occurs once in a thousand subjects.

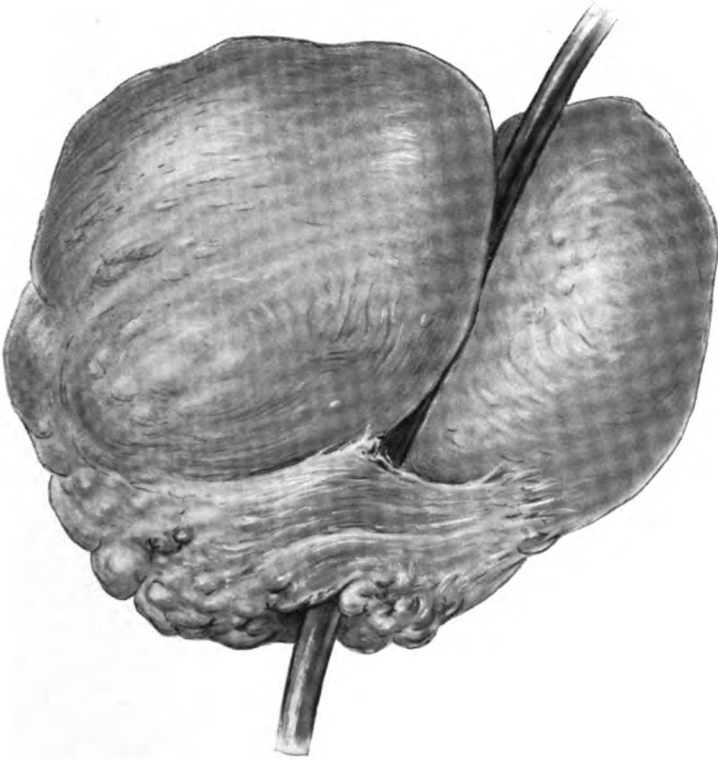
Renal calculus was found in a male, aged 15, who had had his appendix removed ten months previously. Eleven days after operation the old pain, together with nausea and vomiting, returned. The pain was localized in the right iliac region, and did not radiate. No urinary symptoms; no tender points. Such attacks have occurred weekly up to present time. X-ray examination showed a shadow about the size of a peanut at the beginning of the ureter. At operation a blackish, hard, and fairly smooth quadrilateral stone, $1.4 \times 1 \times 0.4$ cm. ($0.6 \times 0.4 \times 0.2$ inch) was removed, and the kidney slung in gauze. This case illustrates the everlasting difficulty of

distinguishing between certain cases of renal calculus and of chronic appendicitis.

Vesical calculus was found in a male, aged 54, who indulged in as much as one quart of whiskey daily. Eight years ago he underwent litholapaxy. One year ago was confined to bed for several weeks with rheumatism. Four months previously symptoms of frequent and painful urination, vesical tenesmus, and sudden blockage of stream supervened, but there was no hæmaturia. Rectal examination revealed a slightly enlarged and tender prostate. A stone-searcher detected the calculus. Amount of residual urine 60 c.c. (2 ounces). There was removed by suprapubic lithotomy a grayish-white, soft and crumpling phosphatic stone, 3.5 x 2.5 cm. (1.4 x 1 inch) in size. Drainage consisted of a tube in the bladder and a gauze strip in the space of Retzius. After operation the patient gradually developed delirium tremens, and died at night of sudden heart failure within eight minutes. Another vesical calculus was found in a patient who had hypertrophy of the prostate.

Hypertrophy of prostate occurred in 4 patients, aged 64, 68, 70 and 80. The youngest patient had, in addition, vesical calculus, and was the only fatal case. The duration of the disease, in order of age, was 4, 15, 9 and 3 years. The common complaint was gradually increasing obstruction and frequency of urination. Dribbling was present in one patient, who complained also of sharp, cutting and burning pain referred to end of penis. Residual urine, in 2 cases, was 10 and 100 c.c. (2.7 and 27 fluidrachms) (Fig. 4). One patient had emphysema, but a normal heart-area, and a No. 27 F. sound could readily be passed. Another patient, formerly an alcoholic, had hypertrophy of the heart, and a stricture of small calibre at the bulbo-membranous junction. The oldest, who took alcohol in moderation, had a greatly accentuated aortic sound. The youngest, who also had vesical calculus, did not exhibit overly strong heart sounds. All of the glands were removed by the suprapubic route, and all showed parenchymatous interstitial hyperplasia. Their size varied up to that of a small apple. The vesical calculus, which had been detected by the X-ray, measured 2.5 x 1.7 cm. (1 x 0.7 inches). The patient from whom this stone was removed died suddenly the second day after operation from myocarditis. One was slightly uræmic after operation, but was greatly improved by daily hypodermoclysis for a week.

FIG. 4.



Hypertrophy of prostate, from a patient aged 80. Catheter traverses urethra.
(Natural size.)

Male pus-tube, or deferential abscess, was present in a patient who developed right-sided epididymitis three weeks after contracting urethritis. Two days later symptoms of sudden pain in the right iliac region with headache, loss of appetite, nausea and constipation, supervened, and the patient noticed that the right testicle was swollen and tender, and that the urethral discharge had stopped. There was muscular rigidity and tenderness low on the right side, and the right testicle was swollen, tender and painful. At operation a localized abscess was found at the internal abdominal ring, and pus in the pelvis. The appendix, connected in no way with the abscess, was removed and the abscesses drained. Culture was sterile.

Hydrocele was radically cured in a patient, aged 19, who had hypospadias and atrophy of the left testis from pressure of the hydrocele.

Varicocele was cured in 2 patients, one of whom was relieved, in addition, of phimosis and hemorrhoids.

DISEASES OF UTERUS AND APPENDAGES

Prolapse of uterus was found twice, once in a patient, aged 65, who had been severely lacerated during childbirth 20 years previously. A chronically inflamed uterus was removed by vaginal hysterectomy, and the lacerated perineum was then repaired. The other patient, who was 27 years old, had born no children, and was operated upon primarily for double pyosalpingitis, the uterus being fastened by ventrofixation.

Chronic metritis and endometritis were seen in 6 patients, 4 of whom were above 35 years of age. It also occurred in 4 other patients who had fibroid of uterus. The common complaint (5 of the 6) was irregular and continued bleeding from the uterus, and all but one were anæmic, the lowest hæmoglobin estimation being 45 per cent. One complained of pelvic distress and bearing-down pain. In every case the uterus was found enlarged; in no case was it stony hard, and in no case was it immovable. Hysterectomy was performed in all cases; in 4 suprapubically and in 2 vaginally. One or more tubes and ovaries were also removed according to the extent of disease found in them, the age of the patient, and the route selected. Thus, in one patient there was bilateral pyosalpin-

gitis, and in 2 fibrocystic ovaries, in one of whom there was chronic salpingitis. An incisional hernia, the legacy of a previous appendectomy, was repaired at the same time for one patient, while in the remaining 3 operated upon suprapubically the appendix was removed for prophylaxis.

These cases of uterine arteriosclerosis and degeneration are liable to be mistaken for fibroid or carcinoma of the fundus, especially since these conditions occur at about the same period of life and may produce similar subjective symptoms. Characteristic of fibroid is stony hardness of the uterus, obliteration of the cervix in some cases, and multiple subserous fibroids in others. Submucous fibroid and carcinoma of the fundus may be detected by examination of uterine scrapings. In fibroid or carcinoma the uterus may be immovably fixed in the pelvis, but in all of these 6 cases of metritis and endometritis it was freely movable. Fibroid and carcinoma of the fundus occur often in nulliparæ, but metritis and endometritis is almost always in multiparæ who have become infected either after abortions or after childbirth. Hysterectomy should be performed if the bleedings do not yield to other means of treatment. It is conceivable that this disease may be the forerunner of malignant degeneration.

Placenta previa was present in a patient, aged 41, who had borne four children and had had one miscarriage, and who was 5 months pregnant. On account of continuous metrorrhagia, the age of the patient and the fact that she had already borne four children, the uterus with the right tube and ovary were removed by supravaginal hysterectomy. The placenta was found on the left side, partially occluding the os.

Extrauterine pregnancy occurred in a patient, aged 31, who had been married ten months and had had a miscarriage a month after marriage. Menstruation was regular up until a month before operation, since which time bleeding has appeared almost daily. Seven days before operation patient was seized with excruciating pains in right side of pelvis, was nauseated, and vomited. Since then bleeding has been more profuse and clots have been passed. Signs of hemorrhage were found in pallor of the face, acceleration of pulse, and vaginal bleeding. Hæmoglobin, 79 per cent. The cervix was somewhat softened, and there was marked tenderness with an

ill-defined mass in the right vaginal fornix. Abdominal section liberated dark fluid blood. The right Fallopian tube was distorted and bound to the ovary by spider-web adhesions. It contained an embryo and placenta about the size of a hickory nut, and was unruptured, leakage having taken place from the abdominal ostium, as well as from the uterine ostium.

Pyosalpingitis was acute in 4 patients, one of whom died of severe streptococcic infection, and chronic in 2—in a patient who had chronic metritis and endometritis, and in another who had fibroid of uterus. Of the acute cases, 3 complained of dull pelvic pains increasing in severity and followed by vomiting. The fourth patient, after a period of dyspepsia and loss of appetite, had a sudden sharp pain in epigastrium, followed by vomiting and localizing in left iliac region. Five days before operation an abscess discharged itself through the vagina with prompt lessening of pain. A chronically inflamed appendix was also removed. In another patient a prolapsed uterus was corrected by ventrofixation. The Fallopian tube from the patient who died yielded streptococci to culture. There had been much opportunity for infection. A year previously she had given birth to a large child, and during the puerperium of five weeks had chills and fever. Succeeding this labor were 2 miscarriages, the second of which was followed by profuse leucorrhœa and bilateral pelvic pains. These patients were all prepared for operation by rest in bed and douchings until the acute symptoms subsided.

Chronic salpingitis was observed in 4 patients, one of whom had also chronic appendicitis, another chronic appendicitis and left hydrosalpinx, and a third chronic metritis and incisional hernia. The characteristic recurring bilateral pelvic pains and tenderness, moderate in degree, were present. Double salpingo-oöphorectomy was performed in the complicated cases. Double salpingectomy sufficed in a woman who was young and whose ovaries were normal.

Ovarian cyst occurred in 11 patients, and was right-sided in 7 and left in 4. There were 2 cases of intraligamentary cyst. The symptoms were gradual enlargement of the abdomen plus those due to pressure on pelvic viscera, nerves, and blood-vessels. Added to these was at times the sharper pain of low-grade chronic peritonitis in a patient, for example, whose pain and tenderness were accounted

for by adhesions between appendix, Fallopian tube, and cyst-wall. A patient whose cyst was found twisted on its pedicle complained merely of soreness of two weeks' duration, instead of sharp pain. One patient, who had been operated upon a year previously for ruptured cyst of the right side, was found to have a multilocular cyst of the left side, which had also ruptured (Fig. 5). Upon one patient, who also had retroversion, Alexander's operation was performed in addition. Two of these patients had also fibroid of uterus, so that supravaginal hysterectomy was indicated twice.

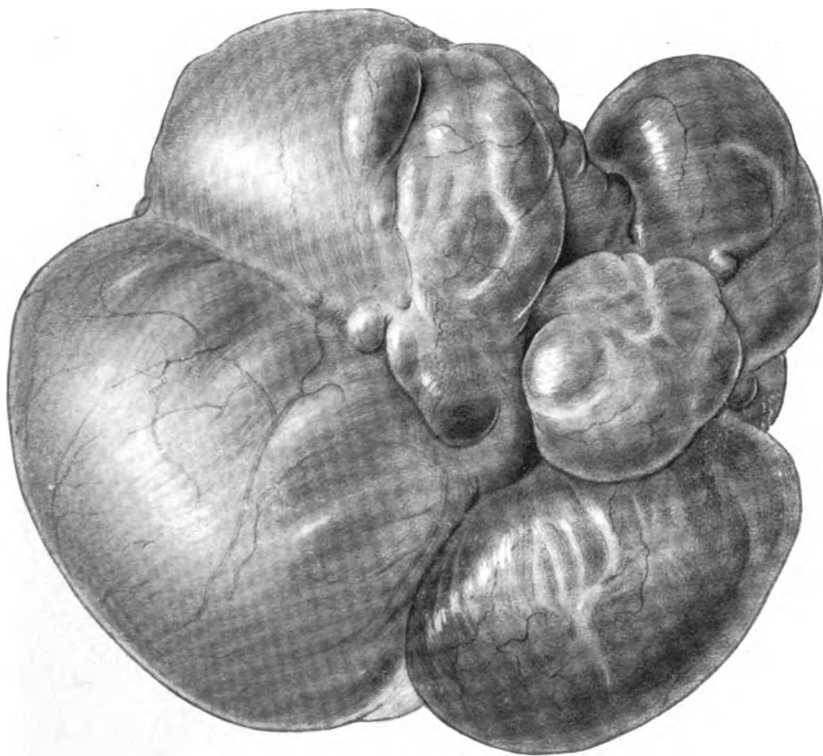
TUMORS

Among the benign tumors were 3 women with goitres of 8, 14 and 16 years' duration, all of which had increased rapidly within the last two years (Fig. 6). Two of these patients had symptoms due to pressure on regional structures. The right lobe was removed in 2 cases and the left in one. In each the stump of the isthmus was treated with liquefied carbolic acid and alcohol. Two of the goitres were cystic and the third parenchymatous. Other benign tumors were one each of nævus of breast, fibroma of breast, lipoma of back, and papilloma of bladder, two of uterine polyp, and ten of fibroid of uterus.

Fibroid of uterus occurred in 8 patients above 35 years of age, and in 2 aged respectively 25 and 31. The symptoms were traceable to pressure upon the pelvic viscera or nerves, or to interference with the pelvic circulation, and therefore varied according to the shape, size, and direction of the growth. Peritoneal pains were conspicuously absent. Vaginal examination showed the uterus enlarged in every case, very hard in most, and usually movable. Hysterectomy was supravaginal in 8 and vaginal in 2, varying according to size and mobility. The tubes and ovaries were not disturbed when healthy and in the young, but one or both were removed when diseased and in those past middle life. The appendix was removed in 6 cases, in 3 of which it was chronically inflamed. Associated diseases were chronic metritis and endometritis in 4, fibroid or fibrocystic ovary in 5, ovarian cyst in 2, and chronic salpingitis in one. One patient also required perineorrhaphy.

Carcinoma monopolized the field of malignant tumors and appeared 16 times, 8 times in the digestive tract, 7 in the reproductive

FIG. 5.



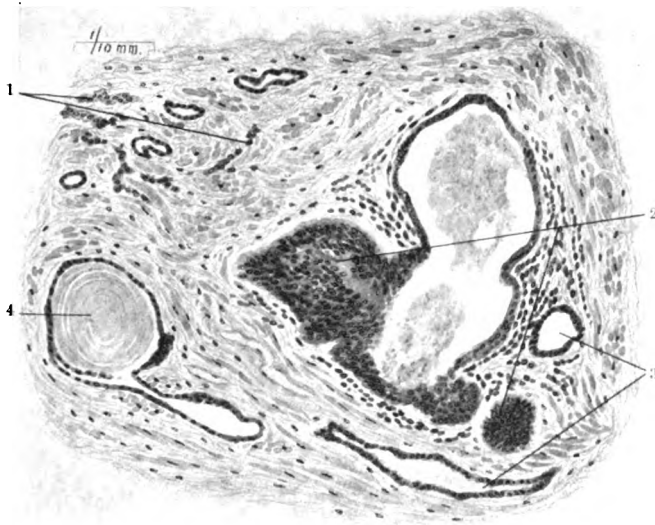
Multilocular ovarian cyst, from a patient aged 52. (Two-thirds natural size.)

FIG. 6.



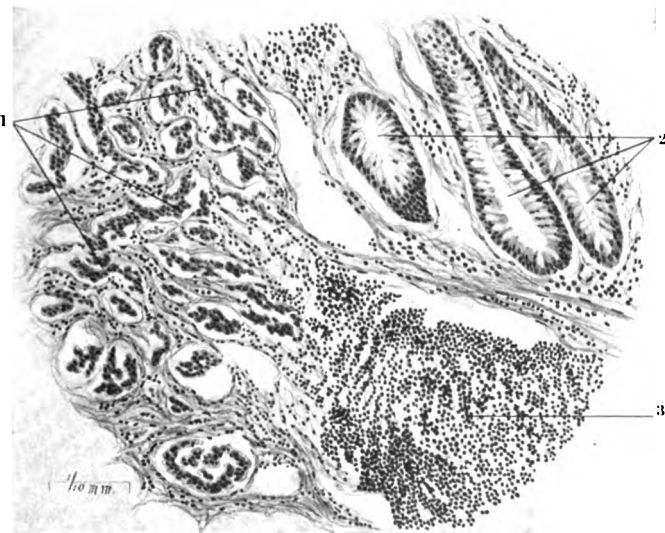
Cystic goitre, from a female aged 32. (Natural size.)

FIG. 7.



Microscopical appearance of a carcinoma of the prostate, from a patient aged 59. 1. Cancer cells. 2. Cancer nests. 3. Alveoli. 4. Concretion, lying within an alveolus.

FIG. 8.



Microscopical appearance of a carcinoma of the appendix, with acute suppurative appendicitis, from a female aged 19. 1. Nests of cancer cells. 2. Glands of Lieberkühn. 3. Lymphatic nodule.

system, and once in the neck. This last patient gave an interesting, if unfortunate, history. She was 43 years of age, and had been an out-patient at the German Hospital for several years for Bright's disease. About a year previously she had bitten the side of her tongue during one of her uræmic convulsions. A little later she noticed a slight ulceration here which enlarged rapidly and soon became painful. About six weeks after the convulsion she was admitted to hospital with an indurated, ulcerating mass on the right side of the tongue, covered with yellowish exudate. Eleven months before the present operation the palpable regional lymph-nodes were extirpated and the right lingual artery was ligated. The right half of the tongue was then removed and the bleeding surface touched with the actual cautery. The microscope showed squamous epithelioma without metastases to one node examined. Three months after operation patient noticed a swelling on the right side of neck. This proved to be a hard mass the size of a small egg, in the carotid triangle. The tongue showed no recurrence. At the present operation, eleven months after the first, the cancerous node was found to involve the external jugular vein, with which it was removed. Microscope revealed squamous epithelioma, the same as the previous growth.

Carcinoma of breast was present in a woman, aged 34, from whose right breast a small cystic tumor had been removed a month previously. The pathological diagnosis was cystadenoma. She returned because of thickening and induration of this scar, with enlargement of axillary lymph-nodes. These were removed by radical operation, and the microscopical diagnosis of adenocarcinoma was returned.

Carcinoma of prostate occurred in a patient, aged 59, who had complained for two years of gradually increasing urinary obstruction, much worse within the past three months, in which time he lost 9 kg. (20 lbs.). Examination showed cachexia and hypertrophy of heart. Cystoscope revealed an enlarged middle lobe, malignant in appearance. Palpation showed that the lateral lobes were not enlarged. The prostate was removed by the suprapubic route. Microscope revealed carcinoma. Six weeks after operation the patient's general condition was improving, he was voiding urine without difficulty, and his wound was healed (Fig. 7).

Carcinoma of vagina occurred in a patient, aged 35, mother of two children, who for eight months had complained of pelvic pains and foul, bloody vaginal discharge. She was constipated and had much pain at stool. Examination revealed an elevated ulcer with infiltrating edges on posterior vaginal wall, which was excised. Microscope showed squamous epithelioma.

Carcinoma of uterus was present in 4 patients, whose ages were 35, 42, 43 and 47. All complained of uterine hemorrhage, which in one was increased by coitus or exertion. In 2, foul vaginal discharge was a feature. The maternal grandmother of one patient died of carcinoma. The cervix was involved in 3, and the fundus in one, diagnosis having been made by curettage. Hysterectomy was performed by the supravaginal and vaginal methods in an equal number of cases. One case showed, in addition, chronic metritis and endometritis and a fibroid ovary, and another, fibroid of the uterus and of the ovary and chronic interstitial appendicitis.

Carcinoma of the bile-ducts occurred in a patient, aged 36, who had complained for eighteen months of frequent attacks of sharp pain in the right hypochondrium, induced by eating. There were no chills or fever, vomiting or jaundice. At operation many stones were removed from the gall-bladder. A hard mass surrounded the common duct and involved most of the lesser omentum, and several hard nodules were seen in the liver about the fundus of the gall-bladder. Cammidge's test was tried upon the gall-stones with negative results. Microscope revealed carcinoma.

Carcinoma of stomach was found in 3 patients whose ages were 27, 37 and 47, and of whom 2 were males. It involved the pylorus in every instance. Two patients had had preceding dyspepsia, which in one was of fifteen years' duration. The estimated duration of the disease was nine months in 2 and three months in one. One complained of distress—fulness and oppression in the stomach—coming on an hour after eating, but relieved by self-induced vomiting. He had lost 35 pounds and was greatly emaciated. Examination revealed the stomach dilated to below the navel and a small, hard, slightly tender nodule at the pylorus. Operation disclosed a large, distended gall-bladder, and a hard tumor about the size of a small walnut on the upper wall of the pylorus, encroaching on the lumen, and involving the adjacent gastrohepatic omentum.

Posterior no-loop gastrojejunostomy was performed. Another patient complained chiefly of vomiting which was independent of, though worse after eating. There was no pain. She had lost 5 kg. (10 lbs.). There was marked constipation. Examination revealed a mass in epigastrium which moved with the stomach. Higher up in epigastrium was a small, hard, very tender mass. Operation disclosed an enlarged, dilated gall-bladder, a greatly dilated stomach and a neoplasm occupying the pylorus and lesser omentum and involving the gastrohepatic omentum. Posterior gastrojejunostomy was performed. On discharge the patient's appetite was good, her digestion excellent, and there was no nausea and no vomiting. The third patient complained of sharp, grinding pain in stomach with nausea and vomiting. In the vomitus he recognized ingesta of the day before. It resembled coffee-grounds. He also complained of symptoms due to weakened circulation, such as numbness across the abdomen, swelling and cramps in legs, and difficulty going up and down stairs. He had lost 14 kg. (31 lbs.). Examination showed the stomach much dilated and a tumor at the pylorus, which was 8 cm. (3.2 inches) to the right of, and 4 cm. (1.6 inches) below the navel. Gastric lavage recovered undigested food and coffee-grounds material. Occult blood positive both here and in the stool. Free hydrochloric acid 17; lactic acid 0. Operation revealed the stomach much enlarged, congested, and with thickened walls. The pylorus was stenosed by a small tumor which did not extend very far on either curvature. Pylorotomy was followed by posterior no-loop gastrojejunostomy and removal of several enlarged lymph-nodes. Microscope revealed adenocarcinoma of pylorus, but no metastases.

Carcinoma of appendix occurred in a young lady, 19 years of age, whose trouble began three months previously with pain in right iliac region. Since then this pain has recurred often, the attacks lasting from one-half to twelve hours. The pain was indicated exactly at McBurney's point, but there was no tenderness here. Leucocytes 12,800. A swollen and inflamed appendix was removed through a McBurney incision, and the stump was ligated and inverted. Microscope revealed acute suppurative appendicitis with adenocarcinoma (Fig. 8).

Carcinoma of caecum was found in a woman, aged 37, who had

complained for three years of slight pains in right iliac region. Bowels have varied between constipation and diarrhoea, and there was aching pain at stool. She had been gradually losing weight, strength and appetite, and was cachectic. Examination showed in the right iliac region a smooth, rounded mass, which was very hard and very tender, and absolutely fixed. Hæmoglobin 38 per cent. Exploratory abdominal section revealed a nodular mass involving the outer side of the cæcum and the ascending colon, which was inoperable.

Carcinoma of sigmoid occurred in a man aged 53 who for some time had had indigestion. Since six months there had been recurring attacks of obstinate constipation. Since two weeks before operation he had had no bowel movement, nor had he passed any gas. He vomited gastric contents, but no fecal matter. He had hiccoughs for twenty-four hours previous to operation. His abdomen had distended gradually, and at times there was considerable pain in the left iliac region. At operation a mass the size of an orange was found involving the sigmoid flexure. Inguinal colostomy was performed. He died before leaving the hospital.

Carcinoma of rectum was found in a man, aged 62, who had had hemorrhoids for twenty years. He gave a history of gradually increasing constipation. Lately, pain began in the lower abdomen and radiated through to the back, but disappeared after stool. He had passed blood, which he attributed to the hemorrhoids. Examination revealed ballooning of rectum, and on its anterior surface, above the prostate, an irregular, rough, somewhat tender tumor about the size of an egg. Hæmoglobin 83 per cent. Inguinal colostomy was performed.

In addition to the operations described above, 40 others of less interest were also performed in the clinics.

DRAINAGE OF THE VENTRICLES—SALINE IRRIGATION—INJECTION OF ANTIMENINGITIS SERUM (FLEXNER) IN CEREBROSPINAL MENINGITIS—MALIGNANT TYPE OF CASES IN WHICH LUMBAR PUNCTURE AFFORDS NO DRAINAGE, DUE TO INFLAMMATORY CHANGES AT THE BASE OF THE BRAIN

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IN the INTERNATIONAL CLINICS for December, 1909, Flexner in his article entitled "Antimeningitis Serum and the Results of its Employment," refers to the therapeutic possibilities of the intraventricular method of treatment. Flexner there states that "Fischer and Netter have carried out the intraventricular form of injection of the antiserum, at least up to the present time without doing injury, but thus far also without strikingly favorable results."

My first case, referred to by Flexner, was an infant seven weeks old with the diagnosis of cerebrospinal meningitis made on admission to the hospital. It was impossible to confirm this by means of lumbar puncture, as several punctures made resulted in dry taps. The bulging fontanelle, muscle rigidity, muscle and convulsive twitchings suggested the presence of fluid in the ventricles. As we were dealing with an infant with an open fontanelle, it was very easy to enter the right ventricle to the depth of 4.5 cm. (1.8 inches). Pus was aspirated, the right ventricle washed with normal saline solution, and 25 c.c. (7 fluidrachms) of Flexner's antimeningitis serum injected through the same needle into the right lateral ventricle.

What at first seemed to be a hopeless case showed evidence of renewed strength after each intraventricular aspiration, washing, and injection of serum. The infant lived thirty-seven days, during which time we performed four lumbar punctures all of which were dry taps. Six ventricular aspirations yielded 200 c.c. (7 fluid-

ounces) of purulent fluid. One hundred and twenty-five c.c. (7 fluidrachms) of antimeningitis serum were injected into the right ventricle, in six injections varying from 20 to 25 c.c. (6 to 7 fluidrachms) at each injection. Lumbar puncture yielded a small quantity of blood-tinged fluid in which the meningococcus could not be identified. Ten c.c. ($2\frac{1}{2}$ fluidrachms) of serum were injected into the spinal canal. This child died. Comparing this case with infants similarly infected and with the same hopeless prognosis on admission, we are justified in giving the Flexner serum the credit for having prolonged the life of this case more than a month.

My last case is of especial interest because it was presented by me at the Section on Pædiatrics, New York Academy of Medicine, March 10, 1910. The child when but seven weeks old was brought to the hospital, with grave prognosis at the time of admission. The infant made a complete recovery, after persistent treatment with the combined intraventricular and intraspinal methods. From a study of the literature, Simon Flexner, in opening the discussion, said that as far as he knew this was the first successful case of cerebrospinal meningitis which was saved by means of the intraventricular method of treatment.

Thus far my experience has been limited to cases presenting positive clinical evidence of cerebrospinal meningitis. Such cases had opisthotonus, fever, a positive Kernig sign, the Babinski phenomenon, besides a *tâche cérébrale*. With such positive manifestations, the diagnosis of cerebrospinal meningitis is most probable. To relieve the intracranial pressure, and to strengthen the diagnosis a lumbar puncture should always be made.

Lumbar Puncture.—The child is placed on either side with the spinal curve towards the operator. An imaginary line drawn through the crest of the ilium to the spine is an easy means of locating the place to puncture.

Needle Required.—In making a puncture we should use such a needle as would be required in making a puncture for empyema. The needle should be pushed a little upward and forward until we enter the spinal canal, then the stylet should be withdrawn. If the fluid does not escape through the needle, it should be withdrawn slightly and the stylet reintroduced to dislodge any obstruction in the lumen of the needle. The puncture should be made as simply

as possible to avoid lacerating the tissue around the vertebral column and causing bleeding by lateral movements of the needle.

Amount of Fluid to Be Withdrawn.—For diagnostic purposes we require from 5 to 10 c.c. (about 2 fluidrachms). Cerebrospinal fluid may appear clear macroscopically and still contain pathogenic bacteria, though few in number may be found. Either a centrifuged specimen or the sediment on standing at least twenty-four hours will reveal the true bacterial content. It may contain, though clear, the *Diplococcus intracellularis*, hence with meningeal symptoms present a careful microscopical examination should be made.

If the spinal fluid is turbid then the more we can withdraw the better. I have withdrawn as much as 50 or 60 c.c. (2 fluidounces). If the *Diplococcus intracellularis* is found in the spinal fluid it is especially important to withdraw as much as possible. The site of puncture should be closed with a strip of adhesive plaster or with a drop of collodion.

Local Anæsthesia.—Ethyl chloride in the form of a spray is useful in very sensitive children. It is not necessary to have general anæsthesia during this procedure. General rules of asepsis must be strictly applied in respect to the child's skin, the operator's hands, and the needle used.

A dry tap may result, first, if the calibre of the needle is small and the spinal fluid very thick; second, if adhesions are present at the base of the brain, preventing the passage of fluid from the ventricles to the subarachnoid space; third, if a successful puncture has been made a dry tap may follow, due to inflammatory adhesions caused by the previous introduction of the needle; fourth, the closing of the foramen of Magendie is the most frequent result of the inflammatory process, resulting in dry tap. A fibrin clot, or the presence of the cord in front of the needle may prevent the outflow of the cerebrospinal fluid.

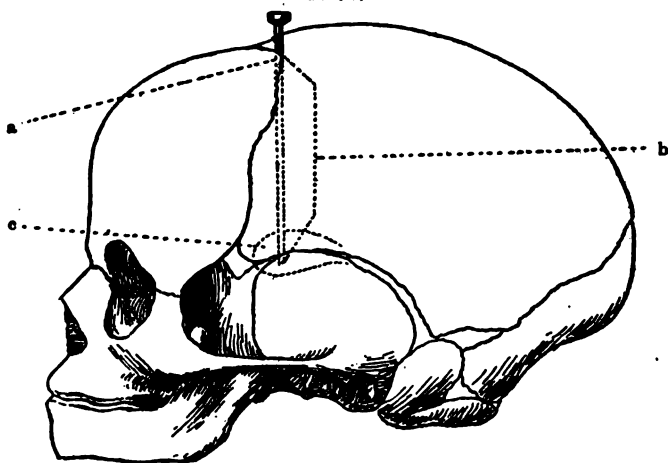
So as to be sure that one is in the canal, if a dry tap exists, the needle should be left *in situ* and a second needle introduced two spaces lower. Sterile water, if injected through the upper needle, will flow out of the lower needle, proving that they are in the spinal canal.

The spinal cord in infants terminates at about the level of the second lumbar vertebra. The introduction of the needle is simplest

between the third and fourth, or the fourth and fifth lumbar vertebræ. In these interspaces there is no cord, hence no serious injury can follow. An imaginary line drawn through the crest of the ilium corresponds to the fourth intercostal space.

Concerning the method of aspiration or injection of the lateral ventricles, we enter at the right angle of anterior fontanelle, the aspirating needle, about 8 cm. (3.2 inches) in length is introduced downward and toward the median line at an angle of about twenty degrees to the depth of about 4.5 cm. (1.8 inches). The needle

FIG. 1.



a, Lateral angle of anterior fontanelle; b, 4.5 centimetres (nearly 2 inches) of aspirating needle; c, lateral ventricle.

enters the lateral ventricles near the median line, presumably through the second frontal convolution (Figs. 1 and 2).

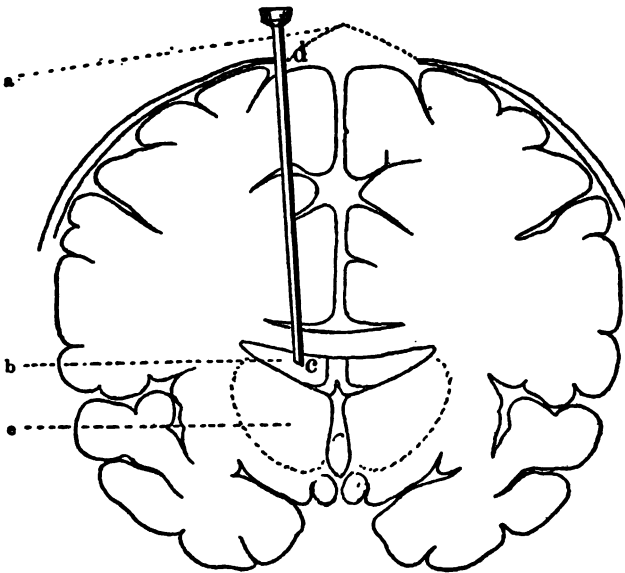
When a stasis of ventricular fluid exists, as in my case, a purulent fluid containing the meningococcus is walled in. If we cannot drain the ventricles by means of a lumbar puncture then we must resort to tapping the ventricles by means of an aspirating needle, this is followed by washing the ventricles with normal saline solution, and lastly injecting the antimeningitis serum as a specific and to modify toxæmia if present.

We must be sure that the lumbar puncture results in a dry tap before attempting to enter the ventricles of the brain. If we choose a space between the third and fourth lumbar vertebræ result-

ing in a dry tap then it is advised to try the interspace between the fourth and fifth lumbar vertebræ. If both of these lumbar punctures give negative results, then and then only is one justified in attempting an intraventricular aspiration. In all of my cases, as also in several of Cushing's reported, there were several lumbar punctures yielding dry taps before any attempt was made to aspirate through the fontanelle and enter the ventricles.

With a larger experience from many observers the proper

FIG. 2.



Coronal section of brain passing through lateral ventricles, and also through middle of anterior fontanelle: *a*, lateral angle of fontanelle; *b*, lateral ventricle, in which is the tip of aspirating needle at *c*, which is inserted at an angle varying from 20° to 0° —the older the baby the smaller the angle; *d*, trochar; *e*, optic thalamus.

therapeutic procedure will ultimately consist in combining the intraspinal with the intraventricular method of treatment. No one is justified in the present state of our knowledge in selecting the treatment of the ventricles and excluding the spinal route unless one or more lumbar punctures have been attempted and each one has yielded a negative result (dry tap).

It would seem from a careful study of my cases that there is no danger incurred by piercing the frontal lobe and entering the left or right ventricle, but rather that relief given from such symptoms of intracranial pressure as are due to the presence of the liquid

confined within the skull. Such pressure symptoms consisted of rigidity, spasms, and continued opisthotonus. To avoid intracranial pressure Flexner has warned against the injection of more fluid than has been removed.

In my cases, all under one year of age, owing to open fontanelles access to the ventricles was simple. If the fontanelle is closed Kocher's method should be employed (*Keen's System of Surgery*, 1908, iii, p. 117). The procedure is identical with what has previously been described and consists of first aspirating pus if present; second, washing the ventricles with normal saline solution; third, injecting antimeningitis serum, 15 to 25 c.c. (4 to 7 fluidrachms), but no more than the quantity of liquid or pus previously aspirated. The fulminating type of cerebrospinal meningitis in infants under one year of age has heretofore offered no hope of success. After a severe infection of this type the infants usually linger several days, rarely longer than one week or ten days, and succumb to the infection. I have already referred to another case,¹ a girl seven months old, with gastric symptoms followed by muscular contractions, restlessness, insomnia, and a sharp cry. Four lumbar punctures resulting in little or no fluid, the lateral ventricle was tapped, and from the fluid obtained meningococci were cultivated. After irrigation with salt solution Flexner's serum was introduced with marked but temporary benefit. In the next few days two ventricular injections and one spinal injection were given. The child's condition gradually improved, and seven weeks later had entirely returned to health. Considering the fact that infants under one year have shown a mortality of 100 per cent., the excellent results following the use of the Flexner serum should stimulate our activity in using it, not only by the subdural method (spinal route) but also as reported here, by the intraventricular method.

¹ Monthly. Cycl. and Med. Bul., 1910, iii, 129; and N. Y. Med. J., 1909, Mar. 26.

Obstetrics

THE CONTINGENT TREATMENT OF ECLAMPSIA

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Not every case of eclampsia calls for the same treatment, and not every case calls for the immediate termination of pregnancy as treatment. Although there is much divergence of opinion, yet these two propositions will, I think, be universally approved by the obstetricians of the present day. The object of this contribution is to endeavor to go somewhat further in the direction of the abandonment of rule-of-thumb methods and the substitution for them of plans founded upon the careful consideration of the needs of each case.

The circumstances under which eclampsia comes before the notice of the medical practitioner differ, of course, widely; and, in order to make plain what I mean by contingent treatment, it is necessary for me to refer to some of these circumstances. For instance, the medical man may discover that a pregnant patient is suffering from albuminuria or from some other of the prodroma of eclampsia; then his duty will be to prevent the occurrence of the convulsions; his treatment will be preventive or prophylactic. Or he may be called to a patient who is having eclamptic seizures in the early hours or days of the puerperium; then his duty will be to treat the fits in the best way known to him, and that way may be medical or surgical or both, but obviously it can hardly be obstetric, for the child is born and the uterus is empty. Again, he may be attending a patient in labor, and she may develop eclampsia during the first or second stage; then he will have two alternative plans of treatment before him: he may either treat the convulsions without interfering with the progress of labor, or he may treat them by treating the

labor, and generally by hastening it. But his choice will not always be a simple one, for other modifying circumstances may be introduced in these labor cases; he will have to discover and take into account whether the confinement is taking place at the full term or before it; and, further, he will have to make a distinction between the premature labors in which the child is presumably viable and those in which he is not. Finally, the medical man may first be brought into relationship with his eclamptic patient by the fact that she develops fits in pregnancy without the supervention of labor pains; under these circumstances he may be at a loss to define his duty to his patients (mother and unborn child), but he will doubtless be led either to endeavor to restrain the fits without interfering with the pregnancy, or to stop the fits by bringing on labor and evacuating the uterus, or to try first the former and then, finding it fail, the latter. To summarize the circumstances under which eclampsia is met with in practice, we may have to do with (1) albuminuria or other prodroma in pregnancy, when the treatment ought to be preventive, and will in many cases be quite successful; (2) eclampsia in the puerperium, when the treatment cannot be obstetric and may be medical or surgical; (3) eclampsia associated with labor, mature or premature, when the management of the case may be non-obstetric or obstetric; and (4) eclampsia in pregnancy not immediately followed by labor-pains, when, also, the treatment may be non-obstetric, obstetric, or non-obstetric followed by obstetric. There are, therefore, four groups or classes of cases in which we may consider contingent treatment.

CONTINGENT TREATMENT

It is not with its meaning of 'uncertain,' 'accidental,' or 'fortuitous' that I employ the word *contingent* in this relation. It is with its more modern signification that I use it. By contingent treatment I mean that dependent for its character upon some prior condition or occurrence; I mean therapeutics decided not by routine or chance but by a weighing of circumstances; I mean freedom of choice within limits. The result, in the special disease under consideration, may be the adoption either of an obstetric or of a non-obstetric plan of procedure; which of the two is chosen will depend upon circumstances, and neither

of the two will be fixed upon by rule of thumb apart from a scrutiny of the prior or concomitant conditions. Similarly the particular form of obstetric or non-obstetric management to be adopted will be determined in a like manner; but the decision will necessarily be more difficult to make, for there is greater scope for difference of opinion and the modifying circumstances are numerous.

ECLAMPSIA IN PREGNANCY

Groups 1 and 4.—Eclampsia may threaten or may actually occur at various times in pregnancy, and the convulsions may not be associated with the supervention of labor; under these circumstances preventive or prematernity treatment is often of the greatest value, and, even after convulsions have come on, non-obstetrical measures will frequently give good results. Let us consider, first, the cases of threatened eclampsia. The pregnant patient may, at the time of the commencement of her gestation, be in an advanced stage of renal disease; she will then in all probability show the prodroma of true uræmia, and may perish in the early months; dyspnœa is often a prominent symptom in such cases, and death may occur without the supervention of convulsions ('eclampsism' or 'eclampsia sine convulsionibus'); and the only treatment which will prolong the mother's life may be the induction of abortion or premature labor. But it is not of these cases of uræmia or uræmic eclampsia that I wish here to speak, but rather of true eclampsia which threatens to come on in pregnancy.

There are certain symptoms and signs which may be regarded as the prodroma of eclampsia. These are chiefly to be found in the urine, and part of the preventive or pre-maternity treatment of this disease consists in regular urinalysis. They consist in persistent decrease in the amount of urine passed; in the presence of albumin in it, especially if the albumin be associated with albumoses, with peptones, and with aceto-soluble albumin; in the diminution of the percentage of chlorides; and sometimes in urobilinuria. Along with these urinary signs there may be œdema, especially of the face, slight jaundice, high arterial tension, amblyopia, severe headache, epigastric pain, and sudden paralysis of groups of muscles. When such signs and symptoms are detected in pregnancy, especially in a first gestation, and more particularly in one

not associated with pre-existent nephritis, the diagnosis of impending eclampsia may safely be made, and medical treatment ought at once to be commenced. Since it began to be known that there was a pre-maternity ward in connection with the Edinburgh Royal Maternity Hospital, I have occasionally got the opportunity of treating cases showing these signs and symptoms, and I have nearly always been successful in preventing the occurrence of eclampsia, although I have not always been able to carry the pregnancy on to the full term or to obtain a living child. The following record may serve as a type of this class of case. The patient was a multipara, aged 35, who had in her two previous pregnancies enjoyed good health. When three months pregnant she was taken ill with severe frontal headache, sickness, and vomiting, there was œdema of the legs, but no puffiness of the eyelids was noticed. She was put on milk diet by her attendant (Dr. Dickson, of Lochgelly), and was given a diuretic mixture; but as she did not improve, indeed the swelling of the legs increased and some days she passed very little or no urine, she was sent in to the pre-maternity ward of the hospital. She was then at the fifth month of her pregnancy. Her pulse was 72, and of high tension; the urine was scanty in amount and highly albuminous ($\frac{5}{6}$ per cent., 4 grains to the ounce); there was generalized anasarca, most evident in the face; the fundus uteri was just below the umbilicus; and no fetal heart could be heard although the patient stated that she felt movements. The cervix uteri was felt to be firm, and the os admitted no more than the tip of the forefinger. The bowels were cleared out by means of an enema and kept acting freely with sulphate of magnesia and dilute sulphuric acid mixture (Henry's solution); a diuretic mixture containing acetate of potassium was given; and the diet was exclusively milk, "milk, all milk, and nothing but milk," according to the formula which I had introduced into ward parlance. Under this treatment, there was an increase in the urine secreted from 470 to 500 c.c. (16 to 18 ounces) in the twenty-four hours, and then to a litre (34 ounces). After five days it was found that the blood-pressure was still high, and the other premonitory symptoms were persistent, so hot packs were ordered and calomel, 0.1 Gm. (2 grains), given. On the following day (six days after admission) she was delivered of a dead five months' male foetus after two

or three pains; the fœtus had a spina bifida. The improvement continued: the albumin, which at the time of delivery was 0.7 per cent. ($3\frac{1}{2}$ grains to the ounce), fell in a week to 0.5 per cent. ($2\frac{1}{2}$ grains), and then disappeared; the pulse which had been 102 when the hot packs were given fell to 85 and 80, and then to normal; the tension slowly came down; the headaches ceased and the œdema disappeared; and, although at the end of a week there were still some granular and hyaline tube-casts and the quantity of urine was low, 850 c.c. (30 ounces) *per diem*, these signs had passed away when she left the hospital (on the tenth day). In this case, therefore, treatment was successful in averting eclampsia; but it is probable that the spontaneous emptying of the uterus had something to do with the good result. Had the means employed not sufficed to procure improvement I was prepared to bleed and inject saline solution, and, amelioration failing, the induction of labor would then have been considered.

The use of thyroid extract in this case was not carried out, for I have come to regard this drug as indicated only when there is reason to regard the thyroid gland as the cause of the prodroma. There would appear to be a form of hard œdema, which, in association with distinct absence of the normal hypertrophy of the thyroid gland, points to inadequacy of that organ as the great cause of the eclamptic prodroma. In these cases thyroid extract may, as Nicholson¹ has shown, be given for even prolonged periods in pregnancy with good results. In a word, the treatment of impending eclampsia with thyroid extract is contingent upon clear indications that the thyroid gland is inadequate.

Now, let me turn to the cases in which eclampsia itself appears in pregnancy without leading to the spontaneous occurrence of labor. Prevention is here no longer possible, but again that does not mean that the pregnancy necessarily comes to an end or is brought to an end. The ideal result to be aimed at is stoppage of the convulsions with continuance of the gestation. How is that to be attained? It is in regard to this class of cases that I have found the pre-maternity ward in the Edinburgh Hospital of the most evident benefit. In 1905, for instance, during my three months' term in charge of the hospital we were called upon to deal with five cases

¹ Trans. Edin. Obstet. Soc., xxvii, 163, 1901-2.

of eclampsia; in three of these we were able to give non-obstetric treatment, the patients spending seven, twelve, and twenty-three days in the pre-maternity ward with the result that all the mothers recovered well; one of the infants was born alive and survived, another was hydrocephalic and stillborn, and the other had evidently been dead for some days before its expulsion. In 1908 we had to deal with five cases of eclampsia in pregnancy: in all of them I was able to give non-obstetric treatment, the patients being in the pre-maternity ward for seven, four, and two days respectively before delivery took place; all the mothers made good recoveries, but I was able to save only one of the babies, all of whom were premature. Again during what might almost be termed an epidemic of eclampsia cases in August, 1909 (there were nine cases sent into the hospital), I was able to treat three of the patients in the pre-maternity ward for three, four, and six days respectively before delivery, and all the mothers (primiparæ) recovered and one out of the three infants. None of the remaining six mothers got pre-maternity treatment, for they all passed into labor almost at once after the occurrence of the eclampsia: all the children were born alive, but one of the mothers died.

The non-obstetric treatment in these pre-maternity cases varied somewhat from year to year. In 1905 I find that I was trusting chiefly to morphine hypodermically, chloroform inhalations during the convulsions, enemata, the hot pack, and saline infusions under the breasts; in one or two cases chloral hydrate was given subcutaneously; and after the fits had ceased purgatives were administered by the mouth, and in one instance thyroid extract. In the years 1906 and 1907 I had only three opportunities of giving pre-maternity treatment in eclampsia, as most of the cases passed at once into labor after their admission to the hospital; but in these three cases I employed the same treatment as in 1905 with the addition of the thyroid extract in all. In 1908 all the eclampsia patients (five in number) received medical treatment before labor supervened, but in one instance the convulsions continued and I had to resort to the induction of premature labor; all the mothers recovered. The medical treatment consisted mainly in the giving of the hot pack, of enemata, of diuretics, of Henry's solution, of injections (rectal or subcutaneous), of saline solution, and occasion-

ally of thyroid extract. In one case venesection was twice performed and saline solution transfused. This exceptional treatment of 1908 became the routine treatment of 1909, when in three out of ten cases of eclampsia I had an opportunity of instituting pre-maternity measures. These consisted of the use of enemata to clear the lower bowel, of the hot pack, and of chloroform as in the other cases already detailed; but, in addition, venesection was performed, about 300 c.c. (ten fluidounces) of blood being drawn off and a litre (two pints) of saline solution introduced intravenously; gastric lavage was carried out with saline solution; and about 300 c.c. (ten fluidounces) of Henry's solution was introduced into the stomach through the tube and the patient kept lightly under chloroform for fifteen minutes to prevent sickness and to allow the absorption of the solution. Sometimes a bicarbonate of soda mixture was used instead of the Henry's solution; and occasionally chloral and bromides were given per rectum and calomel by the mouth. I had almost entirely abandoned morphine by this time. In all the three cases the mother made a good recovery, but two out of the three babies were stillborn.

I think the results of the management of these eleven cases of eclampsia (in 1905, 1908, and 1909) by medical measures have been most encouraging. All the mothers recovered, and in some instances they were able to return to their own homes for their confinement, which took place later without any return of convulsions. Of course it may be urged that these were the milder cases, and the very fact that I was able to give them treatment of a non-obstetric kind in the pre-maternity ward may be brought forward as a proof; but I can only say regarding that view that they had all the appearance of grave cases when they came under our care, and it is quite as fair to maintain that the means used were effectual in checking the progress of the disease. Further, I am almost certain that in previous years I should have been tempted to employ obstetric measures in many of them.

ECLAMPSIA IN THE PUERPERIUM

Group 2.—Very little requires to be said about contingent treatment in the post-partum cases of eclampsia. The contingency of obstetric management is not encountered in these instances; and

the practitioner's choice will require to be made between the various medical and surgical measures which are recommended. Of course, the prodroma of eclampsia will call for the same management now as in pregnancy: a strictly milk diet, evacuation of the bowels, the hot pack, and possibly venesection, the transfusion of saline, and gastric lavage. Similarly, the occurrence of one or more eclamptic seizures will necessitate immediate medical treatment; and, again, the same means may be employed as in eclampsia in pregnancy. It has to be borne in mind that puerperal cases are often immediately fatal, for a reason which has not yet been made apparent. The only one of the nine cases of eclampsia dealt with in the hospital in August, 1909, which proved fatal to the mother, was apparently mild in its manifestations; there were two fits before labor, the confinement itself was well advanced, and forceps were used only to extract the child from the vagina; then a single fit followed, and from it the patient never emerged. In another patient whom I saw some years ago there were no disturbing symptoms in pregnancy and labor; but a single convulsive seizure after birth proved fatal. It is obvious, therefore, that treatment in puerperal cases must be prompt. It is probably on account of the severe nature of some of these instances that surgical treatment has been referred to in connection with them. Personally in a grave form of puerperal eclampsia I should feel tempted to try the effect of spinal tapping or of renal decapsulation; both procedures should, I think, be regarded as temporary means of checking the convulsions and giving time for the action of medical remedies; but, unfortunately they are not always successful even to that limited extent. I have occasionally seen good effects follow the use of thyroid extract.

ECLAMPSIA IN ASSOCIATION WITH LABOR

Group 3.—The association of eclampsia and labor brings with it the necessity for both obstetric and non-obstetric treatment. Something like 60 per cent. of all cases of eclampsia belong to this group. It is sometimes difficult to ascertain whether labor pains or convulsions first appeared, for by the time the obstetrician is in attendance both are present. It is in connection with these cases that there is great need for contingent treatment, for the temptation to follow routine is very real. Too commonly practice takes one or

other of the two extremes, either trusting to medical measures alone in all cases, or having recourse to obstetric interference always; some try the former plan first, and when it does not succeed fly to the latter. Neither inflexible methods nor haphazard management is what is needed, but contingent treatment. I have heard something like the following statement made by an obstetrician of experience: "For a while I relied upon non-interference with the labor in all cases, until a patient died whom I felt I could have saved if I had promptly emptied the uterus; then for a time I swung over to a belief in the efficacy of ending labor speedily, and again for a season all went well, till a case occurred in which I blame the obstetric interference for the fatal result." Let us see whether any order can be introduced into this subject which is so often confused in a practitioner's mind; but, first, let me say that I believe the type of eclampsia differs in different parts of the world. I have been driven to this opinion by a comparison of my methods and results in Edinburgh with those prevailing elsewhere; for instance, I cannot recollect a single case of eclampsia which was not associated with albuminuria in hospital practice here, although I do recall one in private; such cases are apparently far commoner elsewhere.

We may not yet be able to lay down the rules of contingency in intra-partum eclampsia, but we can at least suggest certain considerations. For instance, we shall be much more inclined to apply forceps and terminate the confinement if the patient be a multipara at the full term of pregnancy and in the second stage of labor when eclamptic seizures supervene, than if she be a primipara passing through a premature labor which has been accompanied by a series of convulsions from the incidence of the first uterine contraction. Yet it is possible that in the former case it may be wrong practice to interfere and in the latter it may be an error to withhold one's hand. One of the fatal cases with which I have had to do was well advanced in labor before convulsions came on; only two or three occurred; and, as the second stage was near an end, forceps were applied and the head drawn over the perineum; yet death followed. In another patient, one of my first experiences in eclampsia some twenty-five years ago, two or three fits occurred during labor; I applied forceps and delivered; and a good recovery followed. Evidently the whole secret of success is not determined by

the adoption or the abandonment of obstetric interference; it is contingent upon other circumstances.

Our knowledge of the subject of eclampsia, and more especially of the effect of removing the foetus and placenta from the uterus is not yet so well founded as to enable us always to adopt contingent treatment with accuracy and hope of success. So much in doubt are we sometimes that we find a very real temptation to follow a routine plan, to be succeeded when it fails by a somewhat haphazard running to any other device which may seem to promise well; this procedure is that least calculated to obtain the best results, and at the same time most likely to cause a breakdown in the aseptic precautions with which the modern obstetrician tries to surround and safeguard his parturient patient. Some suggestions, however, may be made.

In the first place, the fact that the patient is already in labor when eclampsia supervenes should not make us put on one side non-obstetric treatment. Even if the patient be in the second stage of her confinement we should still consider whether it may not be well to bleed, to transfuse, to wash out the stomach, to give an enema, and even to put her in the hot pack; the child, it may be stated, will be born before these measures can be carried out, but, even if that be so the medical treatment begun can do nothing but good as regards the future progress of the case.

Again, all the circumstances of the case should be taken into account. Grave conditions are primiparity, the premature incidence of labor-pains especially with a cervix which is not taken up, a large amount of albumin with blood- and tube-casts along with marked decrease in the total amount of urine secreted, numerous seizures, localized oedema rather than generalized anasarca, and absence of consciousness between the convulsive attacks. In the presence of these formidable indications of danger, medical measures will still be of importance, but preparations ought to be made to pursue an obstetric plan in the event of immediate improvement not taking place. The forcible stretching of the cervix with the Bossi or Frommer dilator may be carried out, but although at one time I used this method of emptying the uterus frequently and with fairly satisfactory results I cannot assure myself that it is free from considerable risk. On the whole, I am of opinion that we have in

the vaginal Cæsarean section a preferable method of emptying the uterus in these grave cases of intra-partum eclampsia. The milder cases will, of course, demand less heroic means.

To summarize: I have tried in this communication to recommend a more varied plan of procedure in the treatment of eclampsia than that often followed. It seems to me that our treatment should be made to depend more upon precedent or concomitant circumstances and less upon routine. At the same time it has to be confessed that it is impossible to construct a contingent treatment suitable for every case because our knowledge of all the circumstances governing the development of the disease is still very imperfect. My object, therefore, has been rather to insist on the principle than to fill in all the details. After all, it is the only scientific way, for although we cannot carry it out to its perfect end—the prevention of eclampsia altogether or the saving of mother and child after its occurrence—yet we can feel sure that we are running along the right path.

THE TREATMENT OF PUERPERAL ECLAMPSIA

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At the present time the treatment of puerperal eclampsia is empirical, and I am afraid it must remain in that unsatisfactory condition until the cause of the convulsions is discovered. No doubt the cause is a toxin, but until we know the nature of that toxin we are groping in the dark, and there seems little chance of our discovering an antidote. Until we discover the toxin it seems to me that the most rational method of treatment is to rid the system of this deleterious substance through the usual channels of excretion; viz., the bowels, the kidneys, and the skin. The treatment which I have used for a considerable number of years in my hospital and private work is based upon this.

It will be convenient to deal with the subject under two heads, viz., preventive treatment and curative treatment. Prevention is always better than cure, and in this instance it is markedly so, because if a patient is seen in time and prompt and proper treatment is adopted, the fits can be prevented, and the woman be saved from passing through one of the most terrible ordeals to which she can be subjected. If it were possible to have every pregnant woman under observation during the latter half of her pregnancy, so that she might be put under treatment, if she should show evidence of renal insufficiency or albuminuria, I am quite convinced that eclampsia would be prevented. Unfortunately this is not possible, but in every case in which a doctor is engaged for the confinement, he should, as far as possible, keep his patient under observation. If the woman is pregnant for the first time he should insist on her supplying him with specimens of her urine for examination from time to time, and if this is not possible, he should impress upon her that, if she should feel out of sorts, and especially if she should have any swelling of the legs or headache, she must at once let him know.

With multiparæ this is not of so much importance, but, if he is aware that his patient has at any previous time suffered from renal mischief, he should insist on having specimens of her urine for examination. For a good many years I have insisted upon this, and the result has been that in my private work I have had only one case of eclampsia to treat, and in that case the patient did not carry out my instructions, but trusted to the assurance of friends who told her that it was not necessary for her to consult me about the swelling of her legs and feet. She was in labor when I was called to her, and her urine was loaded with blood and became nearly solid with albumin on boiling. She had fits before the labor was over, but recovered. I have attended her in several confinements since and, needless to say, she has supplied me with specimens of urine as often as I have asked for them. She has never again had a trace of albumin in her urine. The keeping of a patient under observation entails some trouble, but it will pay in the end.

It does not follow that every pregnant woman who has albumin in her urine will take fits, far from it, but every one of them runs a serious risk of doing so, if proper treatment is not adopted. Cases of eclampsia have been recorded where there was no albumin in the urine, but I have never seen one and my experience is not a limited one. I doubt their occurrence. In these cases, I believe, the fits are either hysterical or epileptic.

The preventive treatment consists in keeping the bowels freely moved by means of saline purges, increasing the flow of urine by diuretics, such as the citrate or acetate of potassium and large quantities of imperial drink, and what is of greater importance than drugs, proper diet. If there is much albumin in the urine the patient should get nothing but milk. In slight cases milk diet may be allowed, but meat should be prohibited. I remember one extremely bad case I had under treatment where the patient indulged in meat against my orders, and next day I found an increase in the albumin. I at once demanded to know what she had been eating the previous day, and she confessed she had taken meat. Another point of importance is that the patient must be kept warm, and to ensure this her bed is the proper place for her. If an albuminuric pregnant woman has her skin chilled the strain which is thrown upon the kidneys will probably precipitate matters and bring on con-

vulsions. In the hospital we always expect cases of eclampsia after any sudden fall in the temperature, and we are seldom proved wrong. During November and December of last year we admitted a large number of cases, some of them, especially those which came long distances in the ambulance wagons, were moribund, and died within a few hours. The cases we have to deal with in the hospital are generally very severe, and one reason is, I am convinced, the chilling of the patient during removal. Another reason is that we usually get the patient many hours after the fits have commenced, and thus much most valuable time has been lost. If a patient is to be sent to the hospital the doctor should see that she is well protected during removal and that no time is lost.

To return to the treatment, if the albumin does not decrease, and there is evidence of serious kidney mischief indicated by tube casts and a small amount of urine excreted, then the question of the advisability of terminating the pregnancy arises. Occasionally it will be necessary to empty the uterus, but not very often. In making up my mind I would be guided, not so much by the amount of albumin present as by the amount of urine excreted. If there is a copious flow of urine, even with a fairly large amount of albumin, the pregnancy may be allowed to go on, but, if the flow of urine is scanty, even with a comparatively small amount of albumin, it will probably be well to end the pregnancy.

In this connection I should like to refer to a case which was under my care this year. The patient, a multipara, towards the end of her pregnancy developed albuminuria with tube casts. She also suffered from severe headache and failure of vision. There was very marked neuroretinitis in both eyes. The urine contained tube casts and albumin to the amount of 5 per 1000, Esbach.

The treatment consisted of milk, a diuretic mixture of citrate, acetate and iodide of potassium, and an unlimited supply of imperial drink. The bowels were kept free with saline purges. For a week there was no lessening of the albumin, but the amount of urine excreted was over 1400 c.c. (50 fluidounces) per day. The eyesight improved, and the headache lessened. In view of the facts that the albumin did not lessen, and the amount of urine excreted was not as great as one would have expected from the fluids drunk, I had the patient prepared for the induction of labor, but on the following

day, when the urine was examined, we found the albumin had suddenly decreased to 1 per 1000, so I decided not to perform the operation. The patient improved steadily, and had an easy, natural labor about a week later. On dismissal a trace of albumin remained but the eyesight had improved, and this improvement has continued. The child was alive and is doing well. It is the only live child the woman has had. I have treated many cases of very bad albuminuria with equally good results.

The preventive treatment of eclampsia is most satisfactory, but the same cannot be said of curative treatment. When the fits have commenced the first thing to do is to prevent the woman from injuring herself. She may bite her tongue or cheek, and this should be guarded against, but if the woman has been up at the time of the seizure she may hurt herself when she falls by dislocating her shoulder or doing some other injury to herself. I have seen a case of dislocation of the shoulder where the patient fell in the bath-room. While I was treating her she had several fits, and in each of them she cried out. I was puzzled by this, as eclamptics do not cry out. When the delivery was finished the doctor told me of the fall, and when we examined the shoulder we found it dislocated, and reduced it. The crying had been caused by the pain in the shoulder during the struggling in the fits.

To control the fits different drugs are used, chloroform frequently, but I cannot say I now use it much for that purpose. Chloral and bromide are also used. If the patient is very restless I often use them. Morphine is a favorite drug with some, and veratrum viride is also highly spoken of. I have tried both of these, but have not used either for some years.

It seems to me that to give drugs to stop the fits is not a very rational way of dealing with the disease. If we can remove the cause the fits will cease. The curative treatment I have used for some years is on the same lines as the preventive treatment I have just described, only in a more drastic way in order to get a quicker result. There is no doubt that as a preventive this line of treatment is most successful. In my private work I have had good success with it as a curative method, but in my hospital work the percentage of cures has not been so high, but from the statistics Dr. Munro Kerr compiled from our hospital records a few years ago he showed

that it has reduced the death-rate in the hospital nearly 50 per cent. In private work there is no delay in getting the patients under treatment, and also there is less risk of a chill. Time is of the utmost importance, so there should be no delay in beginning the treatment.

The bowels should be cleared as freely and quickly as possible by means of enemata, and large doses of magnesium sulphate, jalap, or croton oil. If the patient cannot swallow, give the magnesium sulphate or jalap through a stomach tube, washing the stomach out first. Use very large doses. There is some risk in using croton oil, as it may cause œdema glottidis. The parts are already œdematous, and the irritation may increase the œdema so much that the breathing may be dangerously interfered with. I have known this to happen twice. In one case the œdema proved fatal, although the trachea was promptly opened. The other case recovered under a steam tent, but we were prepared to do tracheotomy at a moment's notice.

To act on the kidneys diuretics by the mouth are too slow, so I use injections of normal saline solution with acetate of soda, 1 to 160; 1000 to 1500 c.c. (2 to 3 pints) being given into the areolar tissue, usually under the breast, or directly into a vein. After delivery, the injection can be given into the loose abdominal wall. If proper aseptic precautions are used there is no risk in giving the injections.

Bleeding is a very old method of treatment, and it is very useful, even in cases which are not plethoric, if transfusion is used. We generally withdraw from 400 to 600 c.c. (15 to 20 or more fluid-ounces), being guided by the effect on the pulse. If the toxin is in the blood, as presumably it is, a certain amount of it must be withdrawn in the blood taken away, and the remainder will be diluted by the saline. It has been suggested that the blood in eclampsia is acid, and that the alkali introduced neutralizes the acid. That may be so, but it is for its diuretic effect the acetate is used, with the idea that the kidneys will be flushed out and the toxin removed. If you can get a free flow of urine quickly established the chances for the patient will be extremely good.

The next point is to get the skin to act. Pilocarpin will do this, but it is an exceedingly dangerous drug to use. It will cause

copious sweating, but it will also cause great secretion of fluid into the bronchial tubes, and, as the lungs are nearly always very cedematous, the result may be disastrous. Besides this, the depressing effect of the drug is too great. A hot bath or a hot pack is a better method of inducing sweating. The patient is usually left for half an hour in the hot pack, and then great care must be taken to keep her warm between blankets. All hot water bottles must be carefully covered, and in addition, it is well to have a blanket between them and the patient's skin. If an uncovered hot water bottle is allowed to lie against an eclamptic patient's skin for a few minutes a large blister will form, and if the patient survives, it will be weeks before the burn will heal. I have seen the same effect in an epileptic who took a fit at night, and in the morning a very large blister was found on her leg. Neither she nor her mother ever thought of the hot-water bottle having caused the blister as the patient had only found it comfortably warm when she went to bed. Some years ago one of my residents in the kindness of his heart used a chloride of ethyl spray to save an eclamptic patient the pain of the puncture in giving an injection under the breast. It was mistaken kindness, because, wherever the spray touched the skin it sloughed, and it was many weeks before the part healed. If poultices are used over the lungs or kidneys they must not be very hot. I have seen a patient with the whole of her loins one big burn from poulticing. These may seem minor points, but they are of considerable importance.

If the patient is conscious get her to drink as much imperial drink as possible. When the pulse indicates it, stimulate freely. I generally use strychnine alone or combined with digitalin hypodermically, and alcohol by the mouth or rectum. Washing out the colon with saline solution is strongly recommended, and if it can be done it should be beneficial, but I am very doubtful that fluid can be injected into the colon before delivery. I have never been able to satisfy myself that the fluid passes higher than the rectum.

There is great difference of opinion in regard to the obstetric line of treatment to be adopted. Some say that in every case the uterus should be emptied as speedily as possible, while others hold the opposite view. I have practised both methods and I now let the uterus alone, if labor has not set in, and empty it only if the

fits continue and are frequent. In a fair number of cases I have cured the fits and the pregnancy has gone on to full time. If the labor is going on, and delivery can easily be accomplished, I generally end the labor while the patient is under chloroform for transfusion. If there is post-partum bleeding do not check it at once.

In cases of post-partum eclampsia the same treatment is adopted, and if the pulse is strong, bleeding should be used. Some authorities state that these cases are more dangerous than the ante-partum ones, but this has not been my experience.

There are one or two other points I would like to refer to, chiefly in regard to complications which may arise. Failure of the heart is liable to occur, and this must be guarded against by the use of stimulants, such as strychnine, digitalin and alcohol. Edema of the lungs is nearly always present, sometimes to a marked degree, so great care must be taken to avoid a chill, and the patient should lie on her side with her head low so as to allow the mucus from her bronchial tubes to be got rid of as easily as possible. Dry cupping over the base of the lungs is useful where there is much edema. It is advisable to apply a Gamgee jacket to keep up an equable warmth over the lungs. If there is bronchitis, pneumonia or pleurisy present, the usual treatment should be adopted. Insanity is liable to arise and it must be carefully watched for. As a rule, the patients recover from it, but they require to be carefully guarded from doing injury to themselves. Hemorrhage into the brain occasionally occurs, probably as the result of the fits. In the hospital we had at least two instances of that last summer. In one of the cases the albumin in the urine had markedly diminished, and large quantities of urine were being excreted, but the patient remained comatose and the fits continued. There was a difference in the size of the patient's pupils at times, but, as she was comatose, it was impossible to make out any paralysis of either the arms or legs. We were very suspicious of a cerebral hemorrhage, and as the coma and the fits persisted, we finally drew off 30 c.c. (1 fluidounce) of the cerebrospinal fluid. On the insertion of the needle, the fluid came away in a jet, showing that the tension was much increased, and it was also blood-stained. The patient's breathing became less stertorous as the fluid was withdrawn. It was quite evident there was a cerebral hemorrhage, and as the patient

died we were able to verify the diagnosis by a post-mortem examination, a large hemorrhage being found.

The liver is another organ in which hemorrhages are liable to occur. I have never been able to diagnose them, but have found them in several instances at the post-mortem examination. Why they occur in some cases and not in others I do not know, but I am inclined to think that when they do occur the case is likely to be fatal. The part the liver plays in connection with the disease is not yet understood, but there is no doubt it is a very important part.

CYESIOGNOSIS*

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GENTLEMEN: We are consulted this morning by two women, aged thirty-one and thirty-seven years respectively, each being under the impression that she is pregnant; but after a casual questioning we feel confident that neither is *enciente*. One of these women was here last week, at which time she stated that she had "felt motion of the child," but she now acknowledges that she may have been mistaken, and that the movements are no longer apparent. Menstruation occurred two months ago, there is no evidence of an abdominal tumor, and she says some blood was noted passing from the vagina after she left the clinic last week. Of course it is possible that she may be pregnant a few weeks, but there is no enlargement of the breasts, no change about the nipples, the breasts are flabby, so that really we have not a single visible sign of cyesis.

To the younger men present especially are cases of this kind of the utmost importance. Contrary to the commonly accepted belief, the diagnosis of pregnancy is not always an easy matter, hence you should avail yourselves of every opportunity to study carefully individual cases such as those before us. Remember that there does exist now and then the condition known as pseudocyesis, false pregnancy. Many interesting examples of this kind have been recorded, but the time at our disposal this morning will not permit of their consideration. Both the cases before us may belong to that class. One of these women has given birth to three children, the other five. There have been several miscarriages, otherwise the personal history of the patients presents nothing of especial interest or importance. The second patient makes the statement that

* A clinical lecture delivered at the University of Louisville, Medical Department.

she believes herself to be about three months advanced in utero-gestation, although she admits that she menstruated less than a month ago. She has suffered with morning nausea for several weeks, she has dizzy spells, cannot stand on her feet or walk any distance without discomfort. She tells us that she is cold at times, and hot at others, that she has had some elevation of temperature. Of course this may be due to malaria and may have no reference whatever to the question of pregnancy. It is important that you study cases of this kind with the greatest care, that you see the woman frequently, that you keep her under observation for a considerable length of time, before you make the positive diagnosis of pregnancy. It is unsafe to rely implicitly upon her statements, and unless there are definite indications pointing to pregnancy, you must be guarded in your diagnosis. A woman may have all the characteristic symptoms of cyesis, including pain, abdominal enlargement, morning sickness, changes in the breasts, nipples, etc., and still not be pregnant. A tumor may arise from gas in the intestine, and the ordinary so-called indigestion may give rise to many of the symptoms indicative of pregnancy. Hysterical tumors in every way simulating pregnancy are not uncommon. It is astonishing the number of women who believe themselves pregnant, who will get the baby's clothes ready, who will engage the accoucheur and trained nurse, and when the time for delivery arrives there is nothing found but a phantom tumor! I have observed several such instances in the last years. I remember in one case two most excellent young physicians made the mistake of telling a woman she was undoubtedly pregnant, and everything was made ready for her safe delivery at the supposed term. There was considerable intestinal gas, but no foetus! That woman has since given birth to a healthy living child.

To my mind there is nothing of more importance in the study of obstetrical problems than the symptoms of pregnancy, and most serious mistakes have been made in this connection. Permit me to caution you again to be exceedingly careful about pronouncing a woman pregnant unless you are absolutely positive in regard to the matter. There is nothing that will prove of greater injury to you in the practice of medicine than to make the error of diagnosing pregnancy where a fibroid tumor of the uterus

or some other condition simulating pregnancy exists. For instance, suppose that a single girl comes to you for examination, that she presents many of the characteristic symptoms of pregnancy, if you give it as your opinion that she is *enciente* and it later proves that she is not, the mistake may ruin your practice for life!

In previous lectures we have reviewed in detail many of the signs and symptoms of pregnancy. I spoke of the importance of the fetal heart sounds, which are really the only positive and trustworthy sign of pregnancy, though other positive indications are mentioned in your text-books. In this connection, however, it must not be forgotten that a woman may be pregnant, that there may be a foetus within the uterus, and yet you may be unable to detect the fetal heart sounds. For instance, if the child is dead, if there is an excessive amount of the liquor amnii, if the woman is very fat, if the pulsation of the child's heart is weak, if the child is in an occipitoposterior position,—under any of these circumstances you may be unable to discover the fetal heart sounds, and yet the woman may be pregnant!

Another sign which may be detected in a woman after she is four months advanced in uterogestation is the uterine souffle, which is a blowing sound occurring synchronously with the maternal heart beat. This is a sound which can be heard independently of the beating of the fetal heart, and as it is synchronous with the maternal pulse it is of course heard about seventy times per minute. The sound is produced by the pulse in the uterine arteries. The arteries of the uterus are considerably dilated during pregnancy, there is stasis of the uterine circulation, and the sound is caused by the rushing of the blood through these dilated and tortuous vessels. It is erroneously called placental or abdominal souffle. You will remember that the fetal heart beats at the rate of 120 to 160 per minute, that there is not a drop of maternal blood in the circulation of the foetus, that there is no interchange of blood but an interchange of gases between the mother and the foetus, nor is there any nervous connection between them. Maternal blood introduced into the circulation of the foetus would prove detrimental to the latter, because the blood of the child is entirely different from that of the mother.

The first and most positive sign of pregnancy, therefore, is the

fetal heart sounds. The second definite sign is said to be ballottement. There are two kinds of ballottement, viz., uterine or vaginal, and abdominal. The practice of ballottement, however, is not feasible before the sixth month of uterogestation. In uterine ballottement, have the woman sit in the semi-recumbent position, introduce your finger into the vagina and push upward on the cervix uteri, then suddenly release the pressure keeping your finger in contact with the cervix. By this means the foetus is made to pass upward in the uterus, and its impulse is felt on the finger as it again falls. The foetus being a solid mass suspended in the liquor amnii, the phenomenon described can be produced by ballottement at about six months; but at the eighth month ballottement is impossible because there is too much solid matter and too little fluid within the uterus. On the other hand before the fourth month you can scarcely practice ballottement because there is too much fluid and not enough solid. This is known as vaginal or uterine ballottement, and the sensation imparted to the finger cannot well be confounded with anything else. This is looked upon as one of the positive signs of pregnancy. An important positive sign of cyesis is fetal movement. It is well to remember that there is a difference between quickening and fetal movement, as these terms are ordinarily employed in medical parlance. Quickening signifies the first fetal movement which becomes apparent to the mother, and fetal movement in the strict sense of the term represents the first motion of the foetus which can be detected by the medical attendant. Only a word or two will be necessary concerning abdominal ballottement. The phenomenon is obtained by placing the hand on the woman's abdomen over the uterus, and making sudden pressure which is immediately released keeping the hand in contact with the abdomen. The foetus is thus forced away from the abdominal wall, and as it returns the impulse is felt by the hand.

At about four and a half months of uterogestation the woman will tell you she feels movement of the child, a little tapping, as it were, against the abdominal wall. This is usually slight at first, later becoming more pronounced, so that the movement may become very annoying to the mother. This phenomenon is known as quickening, which means that the woman feels the motion of the child within the uterus. Therefore, if you are asked to give the posi-

tive signs of pregnancy, as we understand them at the present time, you would have to reply:

1. Fetal heart sounds.
2. Vaginal or abdominal ballottement.
3. Fetal movements.

There is another abdominal sign which may be manifest from about the third month until the end of gestation, viz., uterine contraction. How do you detect these uterine contractions? By placing your hand on the abdomen over the uterus, you can feel a distinct contraction and relaxation; but to do this you may have to hold your hand in position for five or ten minutes, and the sensation is only felt for a moment or two. Remember, then, that beginning with the third month, with the hand on the abdomen over the uterus, you can probably feel evidences of contraction and relaxation as the uterus contracts and relaxes. This is a phenomenon which continues from the third month throughout the entire period of gestation, but the woman herself is utterly unconscious of it. She feels movement of the child, it is true, but the uterine contractions are unknown to her until they become painful just as labor sets in. This is known as the Braxton-Hicks sign of pregnancy.

Another sign is umbilical souffle, a high-pitched whistling sound, which may be obtained in addition to the uterine souffle mentioned. However, it is only obtainable in about 10 per cent. of the cases, and it is a sign of danger, trouble, indicating that the umbilical cord is interfered with in some way, that pulsation may be cut off, that the child is in imminent danger of losing its life. This is known as Kennedy's sign.

Fetal shock is a sign of pregnancy mentioned by some authors. What is meant by this? Simply the impact of the child that is felt against the abdominal wall,—the shock. It does not indicate that the fetus is shocked, but it means pressure or impact of the child against the adominal wall. It is oftentimes a difficult matter to detect this sign.

We may group all the signs of pregnancy under two headings, viz., (1) subjective, and (2) objective. The subjective signs are those of which the woman will tell you, the objective are those which can be detected by the attendant upon examination. Another classi-

fication is: (1) positive signs, (2) presumptive signs, and (3) probable signs. Another division would be: (1) physical and rational signs, (2) vaginal and uterine signs, (3) abdominal, cutaneous, and mammary signs. It makes little difference from a practical standpoint how the signs and symptoms are divided and classified, the important feature is to understand them and interpret them properly.

One of the first vaginal signs of pregnancy noted is a slight discoloration of the vaginal mucosa. There is at first a pale violet, then later a purplish discoloration of the mucous membrane. This is especially marked under the meatus. It is known as Jacquemin's sign. Next there is pulsation of the vaginal arteries owing to the increased amount of blood which circulates in this region during pregnancy. Pulsation of the vaginal arteries cannot be detected in the non-pregnant woman, therefore when such pulsation is noted it is an indication of pregnancy. This is known as Osiander's sign. Another vaginal sign consists of a marked increase in the quantity of mucus present in the vagina. As is well known there always exists more or less mucoid secretion within the vagina, but as pregnancy advances we find the vaginal mucus very much increased in quantity. The vulvovaginal glands become slightly enlarged, and their secretion more abundant.

Of the uterine signs we have mentioned but one, viz., ballotement, which can be best obtained at about the sixth month of uterogestation. An important early uterine sign of pregnancy is softening of the cervix, which is known as Goodell's sign. Softening begins at the tip of the cervix, and you will note it becoming softer and softer as pregnancy advances. At the sixth month softening has involved about half the cervix. The cervix feels shorter, but until a few weeks before the advent of labor this shortening is more apparent than real.

Hegar's sign is obtainable sometimes as early as the sixth or eighth week of uterogestation. This sign consists of a change in the shape and compressibility of the uterus, it becomes like a demijohn, it is softer, spreads out and becomes more spherical, and is no longer pyriform. The first six weeks the uterus is pyriform in shape, then it becomes more spherical, and later toward the end of gestation it becomes pyriform again. This change in shape or form of the uterus in the early weeks of pregnancy is known as

Hegar's sign. It is obtained by inserting one finger into the vagina, extending it upward anterior to the cervix, another finger into the rectum an equal distance, then bringing the two fingers together. The change in shape of the lower portion of the uterus can be thus easily determined, it is distinctly spherical, and there is noted a compressibility or marked softness of the isthmus, which is not found in the non-pregnant woman. Toward the end of utero-gestation the spherical form disappears and the uterus again becomes pyriform in shape.

Rausch's sign consists of fluctuation of the uterus, but this is oftentimes very difficult of detection. Much depends upon the individual patient. If the woman has a very fat and firm abdomen, it may be quite difficult to detect any of the uterine signs, but if the abdominal walls are soft and thin, all the signs mentioned may be easily obtained.

The mammary signs are of great importance. There are more or less pain in the breasts and a nodular feel; a darkened areola; a thick and erectile nipple from which colostrum exudes at the third month or earlier, by directing pressure to it with the hand on the breast. The mammae increase in size and large veins appear around the areola; Montgomery's follicles, little sebaceous papules on the areola, become enlarged.

We may, therefore, enumerate the objective signs of pregnancy under the following headings, viz., (1) vaginal, (2) uterine, (3) abdominal, and (4) mammary.

1. Vaginal signs: (a) Oslander's sign, pulsation of vaginal arteries; (b) Jacquemin's sign, discoloration of vaginal mucous membrane; (c) vaginal ballottement.

2. Uterine signs: (a) Goodell's sign, softening of the cervix; (b) Hegar's sign, compressibility of the isthmus; (c) Rausch's sign, uterine fluctuation.

3. Abdominal signs: (a) Mayor's sign, fetal heart sounds; (b) fetal movements; (c) Hicks's sign, uterine contractions; (d) abdominal ballottement; (e) uterine souffle; (f) umbilical souffle; (g) fetal shock.

4. Mammary signs: (a) Enlargement, nodulation, pain; (b) areolar pigmentation; (c) erectile nipples; (d) venous engorgement; (e) enlargement of Montgomery's follicles.

If you will examine the abdomen of a woman pregnant at the

seventh month, if she has borne children previously you will find present the lineæ albicantes; or you may find these as lineæ nigræ, *i.e.*, pigmented lines, which are said to be an indication of pregnancy. In any woman who has borne children, you will find a striated condition of the abdomen, white silvery streaks, which simply means that there has occurred slight rupture of the muscular layer of the skin because of pressure from within, or over-distention. However, you may possibly find the lineæ albicantes present in women who have never been pregnant, due to pressure from large abdominal tumors.

One of the women who was just before us gave some of the subjective signs of pregnancy, still she is not *enciente*. Among these subjective signs morning sickness is most important, from the first to the third month the woman suffering from nausea and vomiting in the morning. The regurgitated matter may consist of nothing except a little glairy mucus, but she is sick at her stomach, and especially is this true when she gets up and tries to walk about. If she eats breakfast and then moves around, the food is promptly regurgitated. You know during the first three months of uterogestation the uterus is well down in the pelvis below the symphysis pubis. As the uterus gradually enlarges there is congestion, or hyperæmia, and this is followed by hypertrophy. The pressure exerted upon the cervix gives rise to considerable pain, and this by reflex action accounts for the irritability of the stomach. When morning nausea and vomiting become troublesome, you should instruct the woman to remain in bed, to eat in bed if necessary, since when lying down congestion is less, pressure is diminished, consequently the reflex and nervous phenomena are not so marked as when she is up and walking about. Such women should be given a light diet and kept in bed. In this way you avoid pressure upon the uterine nerves, the dragging sensation of which many women complain is not present, the umbilicus does not protrude beyond the skin, on the contrary remains cup-shaped. Of course later it comes up as far as the level of the skin, and during the last month of gestation it may be found protruding. Vomiting sometimes becomes intractable, the pernicious vomiting of pregnancy, it is called. As a rule this ceases at the end of the third month, as soon as the uterus ascends out of the pelvic cavity, but in some instances it persists for several months.

I saw a case only a few weeks ago of pernicious vomiting of pregnancy,—the patient was in the hospital; she was advanced to about the end of the second month of uterogestation; it was her first child. She was put upon the operating table, and the attending surgeons wanted to bring about an abortion, but the patient would not listen to such a procedure. Vomiting persisted in spite of all they could do. Of course everything else was tried before it was suggested that the uterus be emptied. The cervix was painted with nitrate of silver, but this apparently did little good, the patient became very troublesome and finally went home. I was called to see her shortly thereafter, and had a great deal of trouble with her. She was a nervous, highly hysterical woman, and I used the best anti-emetics that have been suggested without any especial benefit. Finally she was put on a light diet, constipation which had been more or less prominent was relieved by proper medication, and she was kept constantly in bed. She is now doing nicely and appears to be perfectly happy, vomiting and nausea having entirely ceased. I tried to impress upon her that she would get well, and this is an important point to bear in mind, *i.e.*, an emotional, hysterical woman, especially when pregnant, must be encouraged and buoyed up with hope. Thoroughly cleanse the *primæ viæ*, put her on a light diet, keep her in bed, try to impress her with the idea that she is going to get well, and after the end of the third month the danger will usually be over. The marked psychical disturbances present in cases of pernicious vomiting may be due to a neurosis, a toxæmia, or a retroflexed uterus, which should be carefully investigated and treated.

You may remember I remarked in a previous lecture that a pregnant woman of the present age is usually an invalid. This being true during the last few months of uterogestation you should have the woman's urine examined frequently, you must be on the lookout for puerperal eclampsia, you must do everything you possibly can to get the patient in the best possible general condition so that when labor sets in she may go through it safely. Look after her general system, examine her heart thoroughly, be certain that she suffers from no intercurrent affection, such as malaria or Bright's disease.

There is an excellent physician in this city who has been in the practice of medicine for thirty-five years, and who, being

called to see a woman in the later months of uterogestation, gave her quinine because she had malaria. The woman promptly had a miscarriage, and in reporting the case he gave it as his opinion that the quinine induced the abortion. The question is, did the quinine which was administered in moderate doses have anything to do with production of the abortion? I do not believe it, although some of the text-books state that this drug is an active oxytocic. However, on the contrary, we have the evidence of many physicians who have practised for years in malarious districts that they administer quinine in large doses during pregnancy without fear of its inducing abortion. There may be gentlemen present whose experience differs from mine, but I am in the habit of giving quinine when indicated at any time during gestation, without any fear that it will induce an abortion. I do not believe it ever incites uterine contraction, but it may enhance labor pains when once they have set in.

Little need be said concerning the diet of the pregnant woman, except that during the last month as a rule she should not be permitted to eat any meat. The nipples require especial attention during the last month of gestation. The use of boric acid solution, massage to make the nipple larger, provided it is undersized, etc., are to be commended. Depressed nipples may give rise to a great amount of trouble, and their elongation by adequate manipulation before birth of the child is a matter of considerable importance. The clothing of the woman should be looked after. At all times, but during the last few months of gestation particularly, should she avoid the use of all girdles, garters, belts, etc., in fact anything which might interfere with the circulation should be interdicted. There should not be the least pressure upon either the abdomen or breasts. When we consider how little care and attention are ordinarily given the pregnant and puerperal woman, it is not surprising to see the number of cases that appear in our gynæcological clinics for the relief of ailments which have developed subsequent to labor! The poor woman gets up and goes to work much too soon after confinement, and the fashionable woman suffers equally as a result of tight lacing, or is invalidated by inactivity.

Has it ever occurred to you what organs are pressed upon by the ordinary wide belt worn by fashionable women? It compresses

the liver, the stomach, the spleen, the kidneys. Draw parallel lines around the waist of a woman corresponding to the margins of the fashionable wide belt, and you will find that the most important organs within the female economy are subject to pressure therefrom. If the belt is worn tightly, how can it be expected that the woman can enjoy good health? Moreover, the downward pressure of the belt interferes with the uterus, the ovaries, etc., and it must be conceded these are important organs to the human female. The poor creatures who come to our gynæcological clinics are often forced to do so because they get up too soon and work too hard after confinement before involution is completed, and ignorance or carelessness on the part of the attending obstetrician in not looking after the perineum during labor oftentimes results in perineal tears. Again, the woman may be properly delivered, but receives inadequate after-care. However, in many instances the woman is not properly delivered, the labor goes on as it pleases, no attention is given the perineum, the cervix, or to uterine involution.

I delivered a woman at one of our hospitals some time ago, and the nurses in that institution were very much astonished as they had never before seen a woman delivered when lying on her side. They said it had always been customary there for the attendant to deliver the woman lying on her back. I am aware that this is still the common practice, but there are many reasons why the side position is preferable, and if time permitted we would elaborate the point fully. I will only say it has been shown that about sixty-five per cent. of women who sustain ruptured perinei during labor are delivered in the dorsal position. Of course it must be stated, also, that in about twenty-five per cent. of cases in women delivered on the side there is some rupture of the perineum. In England delivery with the patient lying on her side is the universal custom. It must be remarked in passing that to properly deliver a primipara lying on her side during the perineal stage and watch the progress of the labor requires considerable care and attention, but the wisdom of this position cannot be questioned when you consider the smaller percentage of ruptured perinei that occur. It is a sad commentary that so many women have ruptured perinei which could have been prevented had they been properly looked after during labor!

Dermatology

SEBORRHŒA AND ITS CONSEQUENCES

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THE subject of Seborrhœa appears to me to be one of wide importance in the study of skin disease and it is still, I think, the subject of some misunderstanding in spite of the large amount of work which has been devoted to it. At the outset we are met by the question: "What is seborrhœa?" It is usual to apply the term to excessive greasiness and also to many forms of scurfiness or desquamation of the epidermis. Now the sebaceous secretion is a peculiar fatty mixture and it is not an epithelial structure. It contains water and it is conceivable that by the evaporation of this it may thicken to a certain extent, but it does not and never can evaporate down to an epithelial scale. The so-called "dry seborrhœa" is in reality a form of mild exfoliation and is not seborrhœa. I shall therefore in this paper define seborrhœa as a pathological excess of the sebaceous secretion. The next point is to define what constitutes a pathological increase of the sebaceous secretion. This is a difficult thing to do since the normal variations in the amount are very wide. If we compare the skin of a healthy negro with that of a white man we shall get some idea of the normal limits of variation, and I am afraid that the best definition that I can suggest is that a pathological increase is one that is unusual for the individual or one that leads to the occurrence of morbid complications.

Sabouraud in his classical researches on seborrhœa pointed out that it especially affected the forehead, the nose, the cheeks adjacent to the nose, the chest, and the back, and, in attempting to establish

his contention that the whole process of seborrhœa was one of infection, he stated that this infection affected certain parts and spread in certain directions. Here I think he fell into error. I have examined the skin of the fœtus for this especial purpose and I find that in most of these parts the developing sebaceous glands are particularly large and numerous.

Now let us inquire into the causes of seborrhœa as far as we know them. I must premise that what I say of the causation of seborrhœa may also be applied to hyperidrosis or excessive sweating. The reason for this is that we are unable to separate completely the two processes, and while it is not uncommon to see hyperidrosis without a very greasy skin, *e.g.*, in exophthalmic goitre, I do not remember to have seen marked seborrhœa without at least local hyperidrosis.

The causes of seborrhœa may be divided into general and local. First among the general causes may be mentioned the rapid establishment of the sebaceous function in adolescence. This function is developed at about the same age as those of the breasts, ovaries, and testicles, and just as there often occurs a slight secretion of milk and moderate spermatorrhœa at the age of puberty so at this stage of development there is commonly an excessive secretion of the sebaceous glands.

Of the local causes of seborrhœa we may put first the wearing of excessively warm underclothing, especially if it be of wool, and the dwelling in a hot moist atmosphere. Secondly, we may have a temporary and local excess of secretion on exposure to a very hot sun though this is followed by a complete cessation at the time that the actual sunburn begins. Thirdly, there is a perfectly definite increase of secretion, especially on the forehead, produced by eye-strain, such as occurs with the prolonged use of the microscope or simple lenses. I was first led to observe this by noticing that my forehead became greasy even in the coldest weather after working for some time with a strong lens in my eye while performing electrolysis and since then I have observed it in others after all sorts of eye-strain. If seborrhœa had no other result than to cause the skin to become excessively greasy it would be perhaps annoying from the æsthetic point of view but it would not be a very important trouble. As a matter of fact, however, it is the

underlying cause of a good many cutaneous troubles, and to this is due its importance. So great is the tendency to the occurrence of inflammatory trouble as the result of seborrhœa that one often speaks of seborrhœa when really referring to its inflammatory complications.

Before discussing these complications I wish to draw attention to a point in cutaneous bacteriology. Sabouraud pointed out that the epidermis is not the fruitful breeding ground for all kinds of micro-organisms which some people appear to believe. If one examines the horny layer with the microscope one does not find vast colonies growing in it unless it is diseased. Consequently Sabouraud laid it down as an axiom that where one finds a bacillus or different kinds of bacilli growing in active colony in the epidermis, those bacilli are causing their pathogenic effects, if they have any, and I may add that most so-called non-pathogenic organisms give rise to some form of irritation if they grow actively upon the skin. There is, however, an exception to Sabouraud's statement, namely, that if the secretions stagnate on the skin they form a culture-medium in which micro-organisms may grow without causing a definite infection of the skin. Nevertheless even in this case they are particularly likely to cause irritation of the skin by their products of metabolism. Whether the skin reacts in an inflammatory way or not would seem to depend on the specific irritability of the skin, and as one pair of hands will readily resent perchloride of mercury lotion while another will not, so one skin may be more easily inflamed than another by the products of decomposition of sweat or sebaceous material.

The first complication of seborrhœa with which I shall deal is acne. The eruption is so familiar that it is hardly necessary to describe it in detail. First there is the seborrhœa, then the formation of the comedo, thirdly the inflammation and suppuration, fourthly the bursting of the little abscess followed by scabbing and scarring. In some cases the inflammation, instead of going on to free suppuration, forms a sort of granulomatous mass around a very minute central bead of pus and the lesion persists almost indefinitely. In other cases the comedo may block the mouth of the gland entirely but, no suppuration occurring, a small sebaceous cyst is formed. In other cases again a sort of combination of

the two processes occurs so that a kind of cyst-abscess is formed which refills after having been opened (Fig. 1). Lastly there may occur, especially upon the back of the neck, a marked overgrowth of fibrous tissue to which has been given the name *acne keloid* or *dermatitis papillaris capillitii* (Fig. 2). This manifestation, which is fortunately uncommon, appears to be a complication of severe *acne* and *folliculitis* of the neck and consists of the new formation of fibrous tissue to which has been given the name *acne keloid* or on the affected region. Owing to the contraction of the newly-formed fibrous tissue the hair follicles are displaced and drawn together so that although most of the tumor is bald thick tufts of hair are found in places upon it (Fig. 2).

Now let us for a moment follow the histology and bacteriology of *acne* and see if by their means we can succeed in elucidating the nature of the disease. We have seen that the foundation upon which it is built is oily *seborrhœa* and we have mentioned a few of the causes of this condition. The next point is the *comedo*. If we examine a *comedo* by sections we find that it is structurally not unlike an onion, that is, it consists of a number of layers of epidermic cells arranged in concentric layers. Between the layers of the cells we can show by appropriate staining what appears to be a pure culture of a very small bacillus, originally as far as I know described by Unna and Hodara and afterwards worked with by Sabouraud, Gilchrist, myself, Hallé and Civatte, Fleming, Südmersen and Thompson and Molesworth. The different observers have ascribed different properties to the bacillus. Unna and Hodara considered it to be the cause of the suppuration of *acne*, while they thought that the *comedo* was part of a generalized hyperkeratosis; Sabouraud, who first obtained it in pure culture, believed it to be the cause of *seborrhœa*, the *comedo*, premature baldness and alopecia areata but not the cause of the suppuration; Gilchrist considered that it was the cause of all the stages of *acne* from the *comedo* to the suppuration; my own work led me to limit its action to the causation of the *comedo* only; Hallé and Civatte appear to consider it a harmless inhabitant of the mouths of the sebaceous follicles and they laid succeeding workers under great obligation to them by showing that the bacillus was an anaërobe and hence removing the great difficulty in cultivation which was

Fig. 1.



Sclerophen with acne, showing cystic lesions.

Fig. 2.



Acne-keloid.

before a serious obstacle to its extensive study; lastly Fleming seems to agree with Gilchrist in all but unessential details as regards the part it plays in the production of the suppuration.

A point of some importance arises in the identity or non-identity of the bacilli found by the various observers, and I think it very doubtful whether Fleming's bacillus is identical with that first cultivated by Sabouraud and later more easily under anaërobic conditions by Hallé and Civatte. I have not the slightest doubt from the work of Molesworth, which I have controlled, that the anaërobic bacillus is identical with that found in the ordinary comedo and distributed more or less in the pus of acne, therefore unless Fleming's organism is a variety of this which has lost its capacity for living under anaërobic conditions and gained the ability to live in the presence of the ordinary atmospheric oxygen I think we must conclude that it is not the cause of any of the symptoms of acne. I may say at once that there is a possibility of Fleming's organism being a variety of the anaërobic bacillus since it has been shown by Südmersen and Thompson that the anaërobic bacillus after several transplantations outside the body under anaërobic conditions can eventually be grown aërobically on special media, but as far as I know there is as yet no evidence that the bacillus ever loses its capacity for growing anaërobically, as Fleming's bacillus has done.

Leaving the purely bacteriological side of the question for a moment I wish to draw attention to the histological appearances.

If one opens an acne pustule and squeezes out the contents one finds usually some liquid pus and a small pultaceous mass, which is the remains of the macerated comedo. If now the whole of this material be pressed out between slides and stained by Gram's method one finds that there is in the centre a mass of epithelial cells. Among these one finds an enormous number of the microbacilli, most of which retain the Gram stain very firmly. Further away from the crushed comedo one sees also numerous bacilli lying in the pus and it will be found that these are much less definitely Gram-positive than those which had been lying within the macerated comedo. Almost invariably according to my experience one will also find staphylococci, but I fully admit there are some specimens in which one does not see them. I do

not admit however that their absence from the lesion is thereby proved, as I excised a lesion from one of these exceptional cases in which I could not demonstrate the staphylococcus in the pus and found a colony of them in the sections of lesion, close up to the wall of the little abscess (Figs. 3 and 4).

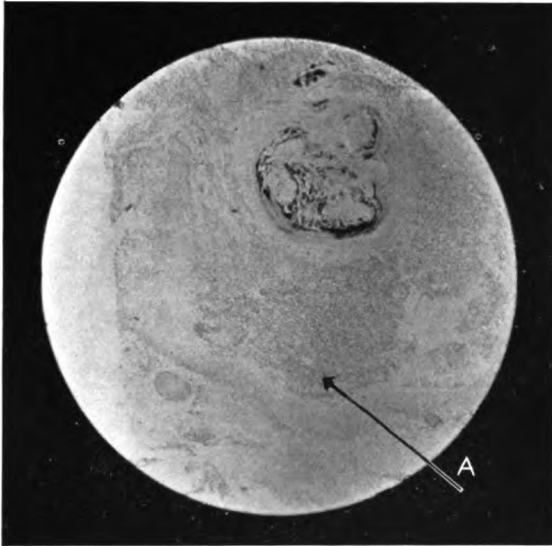
Further if one examines the skin of an acne patient by means of horizontal sections one finds acne pustules, minute comedones and large comedones in close juxtaposition. In every one of these comedones one will find a large and apparently vigorous colony of the microbacillus and yet there is no sign of inflammatory reaction around this! (Fig. 5.) The protagonists of the bacillus as the cause of suppuration have failed to inoculate the bacillus which they have cultivated on the skin in healthy people although they claim to have done so in the case of patients suffering from acne elsewhere. They have therefore claimed that the bacillus is the cause of suppuration in some people but not in others. But, as I have pointed out elsewhere, to sustain this occasional pyogenic quality they must attribute to the bacillus pyogenic qualities in one part of the skin and deny it in another part less than a millimetre distant.

Another point I would make is that the bacilli which are found in the pus are definitely less strongly Gram-positive than those found in the comedo. Now we know that the loss of the faculty of retaining the stain after Gram's method is one sign of the weakening or death of the bacillus, and this is therefore a very suspicious thing when found in the bacilli loose in the pus.

Moreover I can state from my cultivation experiments that bacilli cultivated directly from the comedo are strongly Gram-positive in the first culture whereas those cultivated from the pus are at first only weakly Gram-positive and in later tubes when they grow more vigorously they recover the strong Gram-positiveness.

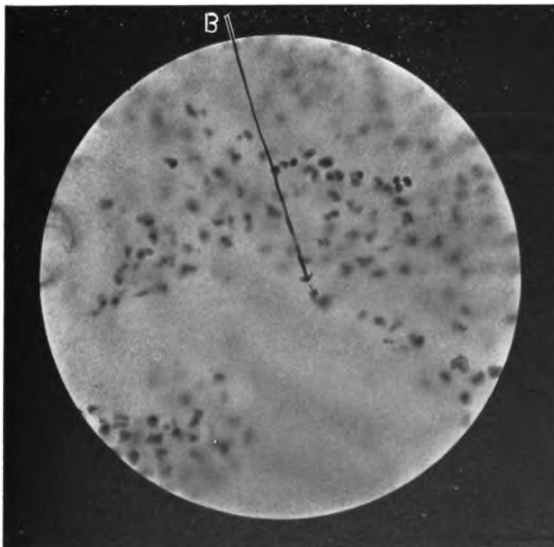
Further it is necessary to deal with the evidence derived from the inoculation of vaccines made from the organisms cultivated by Fleming and the opsonic experiments conducted with them. As regards the inoculation I may say at once that I could not repeat Fleming's results of inoculation. In the first place I did not find on using his vaccine that a dose of one hundred millions caused a marked exacerbation of the disease nor could I convince

FIG. 3.



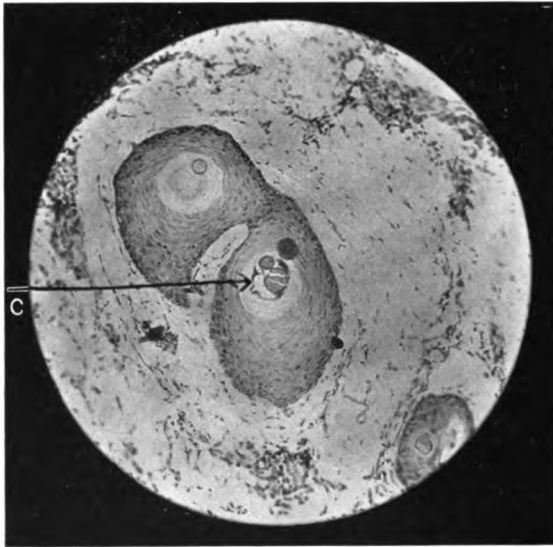
Section of comedo, showing abscess around the central comedo.

FIG. 4.



Area indicated in Fig. 3—enlarged to show colony of staphylococci close to wall.

FIG. 5.



Section of the skin in acne, showing colonies of bacteria without inflammatory reaction.

myself that the inoculation of the vaccine had any very decided effect upon the disease unless combined with the staphylococcus. In this I was at the time greatly surprised as I have always held that the inoculation of staphylococci alone in acne was treating the complication of the disease, and that if we could make a vaccine of the microbacillus, which is in my opinion the cause of the comedo, we should have advanced one step further in the treatment of acne. Since I have carried out further cultural experiments with the true microbacillus I have come to the conclusion that the reason of the failure of Fleming's vaccine in my hands is that it is not the organism either of acne or of the comedo but an accidental contamination, an explanation which would account for the failure of several expert bacteriologists to obtain Fleming's organism from cases of acne.

I have carried out some opsonic determinations and agglutination tests with emulsions of the anaërobic microbacillus and find that many of the indices of acne patients lie within the normal limits though some are outside it either above or below, while the serum of acne patients does not agglutinate the organism. For some time now I have had in use several strains of the micro-bacillus, some derived from ordinary comedo and others from the pus of acne lesions. I have not been able to convince myself that the results of inoculation when one uses bacilli from acne pus differ materially from those obtained by using bacilli derived from the comedo without inflammation. I think there is no doubt that the emulsion is of some value as a vaccine in both cases, but as in earlier days when the staphylococcic inoculation treatment of acne was so much lauded I regarded it as of only limited value, so now I regard the treatment with mixed vaccines as a further step but by no means the final one towards the successful treatment of acne.

I have dealt with the inoculation treatment of acne before alluding to other methods because it seems to follow naturally upon the bacteriological considerations just detailed but I do not wish for one moment to leave the impression that I regard it as the sole means of treatment.

Holding the view that I do as to the causation of the primary seborrhœa, it is obvious that I regard the inoculation treatment even with the newly obtained mixed vaccines as a method of treat-

ing secondary complications only. The question arises whether we can influence the primary seborrhœa in any way. Here I think it is important to separate the seborrhœa of adolescence from that occurring later in life. The former is in reality hardly a pathological process at all and is at all events temporary; the latter is in my opinion always a sign of alimentary disturbance.

If we can remove the complications arising from the excessive secretion in adolescence and keep down the secretion for a time the case will have a great tendency to get well, since the prime cause, the age period, soon passes off. On the other hand in adult seborrhœa unless the underlying cause is removed it will probably tend to persist. Now certain articles of diet have, apart from tendency to upset the digestion, a particular action in increasing the flow of sebaceous material. These articles are in the first place the carbohydrates and secondly the fats. It is not advisable to eliminate both these forms of food from the daily diet, but it is quite safe to limit the intake of carbohydrates to a very small amount, especially if much exercise is not being taken. In cases of adult seborrhœa this limitation of the carbohydrates is more important since they undoubtedly tend to produce the kind of dyspepsia which is so commonly associated with acne. Where dyspepsia is obvious it is wise to omit all articles of diet in which carbohydrates are cooked with fat, such as pastry, all articles containing fat heated to a very high temperature, such as fried things, and all kinds of cheese, especially the strong varieties.

Further we have in menthol a drug which though no specific has three actions which are especially useful in acne. It has a definite anhidrotic and antiseborrhœic action, it has a carminative action in the stomach, and it is to some extent an internal antiseptic. One to two grains of menthol may be given therefore after each meal.

As regards local treatment there is in my experience nothing so certainly efficacious as the X-rays. They must of course be used with suitable precautions but if these are observed they are quite safe. They appear to cause a temporary atrophy of the sebaceous glands with an exfoliation of the infected epithelium of the necks of the glands, and they cause the rapid subsidence of the chronic inflammatory processes at work in the indolent nodules. One word

of caution is perhaps advisable. I have seen cases of slight hirsuties in women that have been treated in the early days of X-ray treatment for the purpose of depilation. In these cases the treatment had failed and the hair had returned, and not only had it done so but it had apparently been much increased in strength and coarseness by the previous depilation. I therefore hesitate a good deal before using the rays for the treatment of acne in women, especially if the family history shows any tendency towards hirsuties.

Apart from the X-rays sulphur is still probably the most useful agent we have for the subduing of seborrhœa. It may of course be used in either ointment or lotion but I am inclined to think that it acts best in the form of a powder, *e.g.*, 3 per cent. to 5 per cent. of precipitated sulphur in finely powdered talc. It should be applied with a powder puff with the eyes shut after the face has been well scrubbed with soap and a rubber sponge, it should be well rubbed in and then the excess wiped off with a soft rag. If much loose powder be left on at night it may work its way into the eyes and cause considerable conjunctival irritation.

We may now pass on to the other complications of seborrhœa, and as these are so very frequently associated I will deal with them together. They are the scurfy condition associated or not with redness and often known as seborrhœa sicca, and the circinate form of subvesicular eczema which is generally qualified by the term seborrhœic. They are perhaps more often found in the subjects of seborrhœa, but they are certainly common in other patients, especially babies, in whom seborrhœa is completely absent.

If we examine the scale from a perfectly dry scurfy head by staining it with methylene blue we shall find that it contains a very large number of the peculiar yeast-like organism commonly known as the bottle bacillus. If there is also a greasy condition of the scalp there will be in addition a considerable number of the microbacilli already described, and if there is any crust formation or tendency to serous exudation we shall also find a peculiar staphylococcus which is distinguished from the ordinary staphylococci of suppuration by the fact that it never causes the liquefaction of gelatin when grown on that medium.

I do not believe that the staphylococcus is a common primary infective agent. It grows well in the axillæ and moist regions gen-

erally, and causes a peculiar sour smell in the sweat. Similarly when grown on agar in artificial culture it causes a sour smell in the incubator, and from this characteristic it has been known as the coccus butyricus. That it does infect the epidermis seems to me to be obvious by its position in the histological specimens, but I believe it invades the horny layer only after it has been broken up by the growth of the bottle bacillus or when an inflammatory reaction due to some other cause has damaged it.

Possibly this inflammatory reaction may be set up by the irritating qualities of the decomposed sweat. The bottle bacillus, on the other hand, seems to be capable of setting up a true infection by itself, and this infection is so general owing to the lack of precautions taken to prevent its spread that we may say roughly that everyone's scalp is more or less infected by it. Certainly some scalps are heavily infected, and others hardly at all, presumably according to the resistance of the individual. At all events we know that is it not, as was at one time thought to be the case, the habitual denizen of all kinds of dry scales as we do not find it present in the scales of psoriasis or pityriasis rosea. As a matter of fact its presence or absence is of great help in the differential diagnosis of these conditions from that of simple pityriasis or so-called seborrhoea sicca.

If we cut sections of skin infected with the bottle bacillus and compare them as Sabouraud has done with sections similarly prepared from a case of pityriasis versicolor we shall be immediately struck with the close resemblance of the two infections as regards site, etc., and if we admit the truly infective nature of the microsporon furfur we are practically bound also to admit that of the bottle bacillus.

The disease starts usually quite early in life and is probably caught from the attendant on the baby, be it mother or nurse. The earliest appearance is a white scaly disc or ring on the scalp so like an ordinary microsporon ringworm that it is only after a careful search for stumps that one is able to make a clinical diagnosis between the two. The infection spreads more or less all over the head, losing as does ringworm its clear configuration as the disease becomes chronic. It may then remain merely as a scurfy condition of the scalp or, more frequently in the extremely

young, enough irritation is set up to produce a mild inflammation and redness. Upon this cocci become engrafted and the well-known clinical picture of seborrhœic eczema results. In the adult this inflammatory reaction of the head is less common, though it does occur, but more frequently a similar, though more transient, condition is set up on the chest and back, which has been called by very many names such as seborrhœa corporis, circinaria, lichen circumscriptus, etc.

In adults when the scalp is weeping and crusted the bottle bacillus, though present, has been largely overgrown by the staphylococcus, but from constant microscopic examination I have learnt to recognize clinically a variety of scalp trouble which appears to be due to the bottle bacillus alone. In this condition the whole of the scalp is reddened and cedematous and is covered with rather thick yellowish scales. There is no serous discharge and I have not come across a case which has given the history of any such, on the other hand there is marked tenderness on pressure and uncontrollable itching. The condition yields rather readily to anti-seborrhœic remedies, such as resorcin or sulphur.

One further point needs mention, and that is the relationship of seborrhœic eczema to ordinary simple eczema. After Unna's introduction of the conception of seborrhœic eczema it was found that almost all eczema could be traced to a form clinically identical with his seborrhœic eczema, especially if, as many observers do, we rule out all acute eczema under the heading of traumatic dermatitis. The supposed criteria of the seborrhœic form were the low intensity of the process, the tendency to spread in discs and rings, and the sharp delimitation of the edge. These are as a matter of fact the particular characters of all septic eczema whether it be of staphylococcic or streptococcic or mixed nature. A true seborrhœic eczema if it exists at all should be limited to those forms which are secondary to true oily seborrhœa, or, if we wish to widen our conception somewhat we may perhaps also include those which are secondary to a bottle bacillus infection, but the main point to realize seems to me to be the fact that any superficial irritation of the skin if the degree be high enough or the skin susceptible enough will determine an eczematous condition. Thus we may see two cases of scabies from the same epidemic in one of which the acarus has

caused the simple scattered eruption of scabies while in the other the symptoms of scabies are masked by an extensive eczema or, as some would call it, an eczematisation of the skin.

CONCLUSIONS

Seborrhœa is a non-infective disorder occurring either in adolescence or as the result of imperfect action of the alimentary tract.

Acne is an infective complication of seborrhœa in which the primitive lesion is caused by the infection of the mouth of the pilo-sebaceous follicle by the microbacillus. The secondary inflammatory complications and the suppuration are due to an additional infection, most commonly the *Staphylococcus pyogenes albus*.

The so-called seborrhœa sicca is a mild exfoliative epidermatitis, is caused by the bottle bacillus, and is not necessarily accompanied by true seborrhœa.

The so-called seborrhœic eczema is a chronic parasitic invasion of the epidermis usually associated with true seborrhœa, and due to the infection by the bottle bacillus complicated by an added infection of staphylococci, streptococci, and other organisms. In some cases the term has been applied also to the eczematisation of the skin by the irritation of decomposing secretions.

Pædiatrics

SCHOOL FURNITURE WITH SPECIAL REFERENCE TO LATERAL CURVATURE OF THE SPINE

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THERE is no doubt that school life under the many-sided adverse hygienic conditions such as prevail, even at the present time, in our public schools, exerts a deleterious influence upon the health of the pupil. His normal growth, his eyesight and his symmetrical physical development suffer under a system of compulsory education which does not fully meet the tremendous responsibility for his physical welfare which it assumes in enforcing attendance upon school.

In theory the health of school children, its provision, and its protection have come to be the foremost factors in their education. In practice it is far from being so. The reason for the perpetuation of unhygienic conditions is, in many cases, a lack of knowledge of the facts and of the remedial measures on the part of those upon whom the physical as well as the mental care of the school child devolves.

Probably in no other branch of school hygiene has so little progress been made in the adoption of well-established principles as in the seating of school children, and this in spite of the fact that the irrational school furniture widely in use in even our modern school houses is known to be injurious to the general health, to elicit and aggravate defects of vision, and to constitute an important etiological factor in the development of spinal deformity.

In this paper I wish to call renewed attention to this question, and especially to the relation of ill-fitting school furniture to the

production of round shoulders and rotary lateral curvature. It is not my purpose to describe a multitude of seats, desks, and mechanical contrivances by which it is sought to solve the problem, but rather to consider the general features which should underlie the construction and adjustment of school furniture.

The rôle played by school life in the causation of spinal deformity was recognized nearly a generation ago, as evidenced by an old report of the Primary School Committee to the Board of Trustees of the Public School Society of New York:¹ "On inquiry of the female teachers several of the oldest and most experienced among them say that instances of curved spine are often perceived among their scholars. Individual members of this Board have noticed similar instances; and it deserves to be mentioned that a highly respectable and intelligent foreign gentleman, who is deeply interested in the cause of education, on a late visit to one of our schools expressed his surprise on perceiving how large a proportion of the girls were round shouldered and stooping in their figure.

"It is a matter of notoriety to the medical profession that, until about 30 or 40 years ago, spinal curvatures were little known. It is only since 'the schoolmaster' has got abroad, only since so great and universal an impulse has been given to education, that these cases have become sufficiently numerous to attract the attention of medical men. There is now to be found a distinct class of practitioners, and of machinists, who live and thrive by the treatment of spinal injuries.

"A large proportion of these cases can be distinctly traced to causes connected with school education. Among the illiterate in all countries, these injuries are scarcely known. They occur most frequently in schools where females are much confined to a sitting posture, with but a scant allowance of those robust and active exercises which impart power to the muscular system and invigorate the general health.

"It should be here explained that the trunk of the body is sustained in its erect posture solely by the action of muscles. Young and growing females who are but feebly endowed with muscular strength experience such a sense of weariness in sitting upright, as to be induced from necessity to drop the body into a variety of

* Barnard, School Architecture.

curvatures, and one particular curve becoming habitual and long persisted in, finally ends in permanent deformity."

Kocher has termed lateral curvature a "school disease." Eulenberg's statistics of 1000 cases show that 88.7 per cent. developed the deformity between the sixth and fourteenth years, and Whitman² reports 201 cases in 130 of which the deformity was first discovered between the sixth and fifteenth years. School life as an influence in the development of lateral curvature was established in 71.25 per cent. of 400 cases of scoliosis under treatment at the Hospital for Ruptured and Crippled.³ Lovett states that lateral curvature of the spine progresses during school life from 18 per cent. in the lower grades to 33 per cent. in the higher.

The mainly sedentary nature of school life demands constant and considerable expenditure of muscular power to hold the trunk erect. Even a strong adult cannot maintain an erect symmetrical sitting posture for any length of time without fatigue; as the body, to relieve the strain upon one set of muscles at the expense of another set, assumes various abnormal postures in which the spinal column changes both in its anteroposterior and in its lateral outlines. In children the tendency toward abnormal sitting postures is much more pronounced. It is also more productive of injurious results, since during the period of active growth it results more readily in a change in form of the vertebra and ultimately in permanent distortion of the spinal column.

The fatigue of sitting is materially aggravated and faulty posture favored by badly constructed school furniture. Especially in the writing position are the most injurious effects produced. Thus Schreiber says that it is the faulty position during writing, due to badly constructed school furniture which is chiefly to be blamed for beginning sciolosis and Hoffa states that most cases are caused by writing. Bradford and Lovett⁴ observed the attitudes of 67 adults undergoing a written examination and found in all a lateral inclination of the body at the end of the second hour. In three-fourths of the number the general inclination of the body was to the right. Schreiber in support of this view says that Schenck has determined the position of 200 children while writing and found that in 160 the trunk was displaced to the left

² Orthopædic Surgery.

³ Orthopædic Surgery.

⁴ Orthopædic Surgery.

on the pelvis, the weight of the body resting on the left elbow and arm, thus producing a left convex total scoliosis; 34 displaced the trunk to the right but turned to the left to relieve the pressure on the right forearm which was used in writing and they exhibited a habitual scoliosis with pronounced right dorsal flexion. Only 6 showed no lateral displacement during writing. In all except 38 the pelvis was not parallel but oblique to the edge of the desk.

Is lateral curvature among school children of such frequent occurrence as to demand administrative notice and to call for the adoption of prophylactic measures? In this country extensive data are as yet not available. In 1903, medical inspectors of the Board of Health of New York City ⁵ found that nearly one third of 1000 children examined had "spinal curvature." This proportion approximates that of European observers: Scholder (Lausanne) in 2314 school children found 24.7 per cent. scoliotic; Hagman (Moscow), in 1864, 29 per cent.; Guillaume (Neufchatel), in 731, 29 per cent.; Kallbach (St. Petersburg), in 2333, 26 per cent.; and Krug (Dresden), in 1418, 25 per cent. Thus approximately 27 per cent. of school children have various degrees of lateral curvature.

In every school room there is a considerable proportion of children who by reason of poor development are peculiarly predisposed to spinal deformity. There is hardly any doubt that the habitual faulty postures are responsible for a majority of the cases of scoliosis beginning during school life and that attention to the rational seating of pupils would often prevent the development of this deformity. This will be more clearly understood by a consideration of the mechanism by which irrational school furniture produces distortions.

The fundamental requirement which a school seat and desk must meet is that it conform in its dimensions to the physical proportions of the child which is to occupy it:

1. Considerable variation exists in the height of children of the same age. Bowditch's measurements of 24,595 Boston school children show that, for instance, the height of boys six years of age ranged between 40.66 and 47.13 inches, and that of girls of the same age between 40.57 and 47.36 inches. These variations in height are found for each year of age. Thus the difference between the maxi-

⁵ Bureau of Municipal Research, Sept., 1908.

mum and minimum height of boys eleven years of age was 8.03 inches and that of girls 8.63 inches. These figures agree closely with those of Fahrner of Zurich who found the height of boys six years old to vary between 40.74 and 47.04 inches and that of girls between 40.55 and 46.06 inches. At eleven years of age his figures are 48.62 to 56.10 inches for boys and 49.61 to 57.87 inches for girls.

2. The rate of growth varies in the sexes, the most rapid growth of girls occurring between twelve and fourteen and that of boys between fourteen and sixteen. From birth until the twelfth year boys average taller than girls.

3. There exists a seasonal variation in growth, the maximum occurring between March and August.

4. The growth of children is marked not only by an increase in stature but also by constant changes in the proportions of the parts of the body, of which the most important in relation to school furniture are the length of the legs and the distance of the elbows from the seat surface for the determination of the height of the seat and of the desk respectively. As regards the sitting height we find that up to ten years the boy's body is longer than the girl's, but from ten to sixteen the girl's is longer. There is also a variation in the length of the extremities.

The importance of the correspondence, especially of the height of the seat and desk to the size of each pupil, was recognized by the earliest writers. Thus Barnard in his classic work on "School Architecture" (1841) says that in the construction of school furniture regard must be had to the varying size of the occupant "so that no one shall be subjected to any awkward, inconvenient, or unhealthy position of the limbs, chest, or spine." This object was believed to be attained with sufficient exactness by the construction of one size of non-adjustable seats and desks for each grade, the dimensions being based upon measurements of children at different ages. Barnard was the first to tabulate such a scale and since his time many scales have come into existence. It must be understood, however, that age, grade distribution, and the size of pupils are not necessarily dependent one upon the other and that therefore one size furniture for pupils in the same grade cannot provide for the majority a proper seat and desk. The necessity for more

accurate school furniture led, in some instances, to the construction of one size for each grade based upon measurements of pupils in the grade. Thus it was found that the heights of the majority of pupils in each grade fall within closely approximate limits and the mean between these limits was taken as the basis. Less accurately the height of the furniture was based upon the mean between the maximum and minimum heights of all the pupils in a particular grade. However, no matter which of the many scales is adopted, practical experience establishes beyond controversy that one size of furniture does not meet the requirements. This has given rise to the adoption of two or three sizes for each grade, and even at the present such a system is held to be all-sufficient by some authorities. Non-adjustable furniture of even two or three sizes for each grade would not fit a large number of the pupils, however, and would force many of them into uncomfortable and injurious postures. Only by furniture which in regard to height can be raised and lowered as necessity demands can we secure to each pupil a properly fitting seat and desk. Such adjustable furniture was first introduced about sixteen years ago, but its adoption in our public schools has been very slow and inadequate, so that the antiquated condition of one size of non-adjustable furniture for each grade still prevails in most schoolrooms. However, school boards, everywhere, are awakening to a realization of this, and in the older schools the non-adjustable seats and desks are being gradually replaced by such as possess adjustable mechanisms, and the new school houses are being furnished with them either entirely or in part. In the latter case a certain proportion of adjustable furniture is allotted to each class room, the remainder being of the non-adjustable type. Such a system may also be said to be inadequate, especially as pupils are usually seated according to their scholastic standing and not according to their size.

The responsibility of school boards does not cease with the mere providing of adjustable furniture, they must see that an intelligent use is made of it. In several new school-houses provided with a certain proportion of adjustable furniture I have had occasion to observe both the seats and desks remaining at their minimum height and corresponding to that of the fixed furniture.

In the older writings and reports on school furniture seats and

desks are invariably described as being too high. This is rather vividly portrayed in a report of the Superintendent of Common Schools of Connecticut in 1848.⁶ He says, "Desks and seats are so high as to be better adapted to the children of a race of giants, than these of the present generation. My compassion has been deeply moved as I have frequently entered these abodes of suffering and seen their unhappy inmates—the children of protestant parents—doing penance upon their high seats with no supports to their backs but the soft edge of the projecting board which forms the desk and with the feet dangling in mid-air several inches from the floor. And when I have looked upon these youthful sufferers, thus seated and writhing with pain, the question has often arisen in my mind, what have these ill-starred children done that they should be doomed to so excruciating torture? What rank offences have they committed that they should be thus suspended between the heavens and earth for six hours each day? And from deep-felt pity I have sometimes wished (perhaps it was cruel) that their parents had to sit for one hour in a similar position, that they might learn how to pity their children, and be prompted to attend to their health and comfort in the internal arrangement of the school-room."

A personal examination of the seating of pupils in ten schools, practically all equipped with one size of non-adjustable furniture for each grade showed the opposite condition to prevail to, perhaps, an equal extent: in the lower grades seats and desks being frequently too high and in the higher grades too low for the pupils occupying them.

Taking up the consideration of the seat in its effect upon posture we find that one which is too low forces the legs into a cramped and uncomfortable position, to one side of the body. With such a seat the pelvis assumes an oblique position upon the supporting surface and if there is an attempt to sit with the shoulders parallel to the desk there results a rotation of the spine from a change in the planes of the shoulders and pelvis. A low seat also favors a collapsed, sunken-in attitude, and associated displacement of the trunk to one side with a lateral bending of the spine to the opposite side. Thus are induced changes in the contour of the spine which if habitual are extremely favorable for the development of lateral

⁶ Barnard, School Architecture.

curvature and round shoulders. Furthermore the doubled-up attitude, especially if aggravated by a low desk, becomes injurious to health by interference with proper respiration and by pressure upon the abdominal organs. From a pedagogical standpoint the resultant uneasiness must materially interfere with discipline.

Seats too high are not conducive to muscle economy. The tendency here is to slide off the seat so as to bring the feet to the floor. The body is balanced upon the anterior edge of the seat and the muscular strain is greatly increased. A seat too high is incompatible with a well-balanced sitting posture. Even where there are no other errors in the adjustment of the furniture, the dangling of the legs is extremely uncomfortable and often results in injurious pressure upon the thigh. The height of the seat, therefore, should be adjusted to the length of the leg so that the feet will rest squarely upon the floor with the legs at right angles to the thighs and the latter resting equally upon the supporting surface.

There are several other features to which attention must be paid in the construction of school seats and which lessen the fatigue of the sitting posture and favor more symmetrical attitudes. The seat must be of a proper depth anteroposteriorly because the contact of the thighs with the seat surface forms an important support for the trunk in the sitting posture. Most important of all, a narrow seat permits the pupil to slide forward and results in a posture in which the body is supported by the lower end of the spine where it rests upon the seat and by the upper part of the spine where it presses against the seat-back, leading to one of the most deforming postures. It should be no greater than approximately one fifth of the average body height of the pupils in each grade.

A level seat surface favors the constantly present tendency of the pupil to slide forward in the seat in order to assume as nearly as possible a reclining posture. The seat should therefore possess a concavity, beginning about one and a half inches back of the anterior edge and deepest ($\frac{3}{8}$ in.) where the tuberosities rest. If deeper than this the pelvis becomes tilted and produces secondary spinal changes. Finally, the edge of the seat should be well rounded to prevent undue pressure upon the thighs.

However, a proper seat is not in itself sufficient to permit of a symmetrical sitting posture for any length of time, i.e., in which

the tuberosities rest evenly upon the seat with the arms in a line with the trunk and the latter so poised that the line of direction of gravity meets a line joining the tuberosities. Such a position of the trunk is, however, very difficult to maintain for any considerable period of time without fatigue and consequent changes in the symmetry of the spine, especially in its lumbar region. Material aid is given by adequate support of the back and especially of its lumbar portion. It is therefore a necessary requisite of a proper school seat that it furnish such support. Not only should it be available when the pupil is sitting quiescent but also, as far as possible, when writing. And again, even with adequate support of the back pauses of rest and change of position are needed. This need should be met without forcing the pupil to assume less favorable attitudes.

In the absence of a back rest affording an efficient support to the spinal column there is a collapse of posture, a doubled-up attitude as far as the soft parts permit or the pupil slides downward and forward to nearly a reclining position or rests the arms upon the desk. As a result there occurs a displacement of the spinal column forward in its upper portion and backward in the lumbar region. When no support is afforded by leaning the arms upon the desk a change in the plane of the pelvis becomes necessary. This is accomplished by a decrease in its horizontal inclination as a result of which the normal lumbar lordosis becomes obliterated or converted into a kyphosis. The associated forward inclination of the head produces a similar change in the cervical region and the dorsal spine becomes flattened, and there is usually an associated lateral inclination and rotation of the spine to relieve the strain of one set of muscles at the expense of another. It is generally agreed that these changes are important predisposing steps in the development of lateral curvature.

Even where the improper seat-back does not result in serious deformity it exerts injurious influences upon the general health. In the doubled-up attitude the abdominal cavity is lessened and its contents subjected to abnormal pressure. In the chest, lung capacity is lessened, there is interference with proper respiratory movements and the general health and resisting powers are decreased.

It will be seen that a proper back rest must be such as will sup-

port the trunk in an upright symmetrical sitting posture for all school work and permit a somewhat inclined position to relieve the strain upon the lumbar ligaments and fascia without lessening the lumbar support.

In order to meet the first of these requirements three types of seat-back or a combination of them have been advocated. They are the low pelvic, the lumbar, and the dorsal support. The claims of superiority of any of these forms of seat-backs over the others have been based on a study of the mechanism involved in the sitting posture. Herman Meyer (*Die Mechanik des Sitzens mit besonderer Rücksicht auf die Schulbankfrage, Virchow's Archiv*, 1867) discusses the support of the trunk and its maintenance in an erect posture. Whether the direction of gravity of the trunk (including the head and arms) falls in front of a line joining the tuberosities of the ischium or behind this line, in either case, besides the tuberosities, at least one additional point of support is necessary in order that the trunk may be in equilibrium. When the direction of gravity falls behind the line joining the tuberosities, the prominence of the sacrum furnishes the third necessary point of support. These three points being fixed in relation to each other, muscular effort is reduced to a minimum, and therefore we frequently find this position utilized. The disadvantage is that the trunk is inclined so far backward that the spinal column must be strongly flexed unless the trunk be supported by a back rest, backward inclination of the trunk being incompatible with work at a desk.

In the opinion of Meyer and more recently of Cohn a seat-back reaching as high as the last lumbar vertebra gives the necessary support to the pelvis. The low pelvic support further meets the second requirement of a proper seat-back by permitting free motion of the trunk in all directions and backward bending of the trunk in the movable lumbar region to relieve, even momentarily, fatigue of the back muscles. The disadvantages are that the spine is not a fixed column but consists of movable parts, that the maintenance of its normal curves depends upon muscular activity, and that fatigue of these muscles results in changes of contour and abnormal postures even with this pelvic support. The fatigue cannot be lessened by a low pelvic support, nor is the "stretching" permitted by it sufficient to furnish the relaxation demanded even by the strongest adult.

In practice it will be found that this form of seat-back does not favor a long-continued symmetrical and erect sitting posture.

Much more satisfactory is a seat-back which also firmly supports the weakest portion of the spinal column,—in the lumbar region. But here too the objection holds good that it does not permit the pupil to assume a somewhat reclining position for relaxation.

The inevitable sliding forward from fatigue is favored in the third type of seat-back—the dorsal, or a combination of the same and the lumbar—the tuberosities and the upper dorsal region being supported by the seat and back-rest respectively while the lower dorsal and the lumbar spine are left unsupported. The spine is bent upon itself and induces the doubled-up posture, the changes in the lumbar spine, and the injurious consequences previously described.

If, however, the dorsal seat-back is constructed so as to conform to the normal curves of the spinal column and particularly to that of the lumbar region, and the seat surface as outlined above, this objection may be disregarded. As a matter of practical experience the dorsal seat-back furnishes the most efficient support, especially while writing. If in addition it has a backward inclination of about ten degrees it also permits of the nearest approach to a reclining position compatible with school work. Thus it may be said that both theoretically and practically a seat-back reaching as high as the angles of the scapulæ, conforming in outline to the normal curves of the spinal column, and somewhat inclined backward answers the most important requirements of this part of a rational school seat.

In considering the features of the school desk proper its two important relations to the seat are best considered together. These are the vertical distance between the desk top and the seat surface and the horizontal distance between the posterior edge of the desk top and the anterior edge of the seat, spoken of respectively as “the difference” and “the distance.” The latter may be either “plus,” “minus,” or “zero.” In the first case the desk and seat are set so that the vertical lines dropped from the rear edge of the desk top and the front edge of the seat leave a space between them; the minus distance is that relation in which the first vertical line falls in the rear of the second and zero distance when the two lines coincide. The “difference” in non-adjustable school furni-

ture of one size for each grade is based upon the relation between the distance of the elbows from the seat surface when the arms rest at the sides and the total body length. This relation necessarily varies with different series of measurements. However, even admitting that these two variable quantities can furnish an approximate difference to fit pupils of varying size in each grade there are other factors which practically preclude the possibility of arriving by such measurements at a fixed height of desk for each grade which will meet the primary requirements.

If it be accepted that the desk shall be of such a height that the forearms of the erectly sitting child shall rest comfortably upon the desk without necessitating the raising of the shoulders then the desk must be somewhat higher from the seat than the proportion of the body length determined from the above measurements. This is due to the fact that when the arms are brought forward in writing the elbows are raised. This addition must naturally vary in



proportion to the body height. The difficulty in determining it is increased by the fact that in writing only one-half to two-thirds of the forearm and not the elbows are placed upon the desk and as a result of inclination of the desk top the forearms are directed upward and the elbows are therefore lower than the posterior edge of the desk top. Also in regard to vision, the difference for the larger children whose visual capacity does not grow with body length must increase not in proportion to height but in a larger measure.

I have tried to show briefly that the height of a fixed seat cannot be determined with any degree of accuracy from measurements of groups of children varying in size and physical proportions as much as pupils to be found in each grade, nor from larger groups. The same is true of the desk, which should likewise be adjustable.

The question of "the distance" is one that has given rise to much dispute. In the earlier writings mention of this is either entirely omitted or the distance given is as a rule too large. Plus-

distance, especially if too large, is injurious both to the symmetry of the spine and to the eyesight of the pupil. Such a distance compels the pupil to bend forward. Herman Cohn says that a positive distance necessitates a closer approach of the eyes to the book and a forward inclination of the head and that "it is quite clear that the larger the distance the more the trunk falls forward in order that the arms shall reach the paper, and the more the head inclines forward closer to the writing. If we wish to sit erect at a table we instinctively push the chair so far under the table that its posterior edge lies vertically over the anterior edge of the seat, or, where possible overhangs it." And again "the nearer the seat to the table, the more erect the position of the trunk, the less close the eye comes to the paper, the less it becomes over-filled with blood, the less the danger of myopia."

The purposes of a plus-distance appear to be,—free access to the seat, to enable the pupil to stand without leaving the area of the seat and desk, and greater freedom of motion when seated. As regards the first two there can be no doubt that it is advisable to sacrifice these advantages for the greater benefits to posture and vision. Pupils in the elementary schools spend the major portion of their school time in sitting, and when called upon to stand it is immaterial whether the pupil stands between the seat and desk or in the aisle.

Let us now inquire into the effects upon posture of too large a distance and difference—a very common error. When the line of gravity falls in front of a line joining the tuberosities, the third necessary support is the line of contact of the thighs with the front edge of the seat. The tendency of the trunk to fall forward is counteracted by the activity of the muscles of the back and pelvis, and by leaning one or the other arm upon the desk or by leaning against it with the thorax. The effect of too large a distance or a fixed plus-distance is the necessity of bending the whole trunk forward in order to bring the hands and head above the desk. This is accomplished partly by flexing the trunk upon the thighs and partly by a curving of the spinal column. The necessity for and the degree of the forward inclination and of the curving of the spine are in direct proportion to the distance. If the latter is not excessive and is not combined with too large a difference, leaning the arm upon

the desk may not be injurious except in so far as it interferes with the free use of the arms and hands. When in addition to too large a distance, the difference is too great, there is, in performing work at the desk, an attempt to raise the whole body, as a result of which the pelvis is raised from the seat, the inclination of the trunk forward is increased and the whole body is balanced upon the anterior portion of the seat surface. In order to place the arms upon the desk the shoulder-girdle is raised as far as possible, while at the same time the arms must be utilized to support the trunk against falling forward and in lifting it upward—a most uncomfortable and fatiguing requirement.

As a result of too large a distance and difference the inclination of the trunk is more marked to the right where the hand is utilized in writing, the weight is thrown upon the left side of the pelvic bone and by using the right arm as a support the right shoulder is raised and the spine curves to the right in the scapular region. In the early years of school life a long total curve to the left with the right shoulder-blade lowered is usual; later it becomes raised as a result of the persistence in the attitude described above and the upper portion of the spine deviates to the right while the lower remains to the left. This mechanism is favored by the position of the copy-book. If this is held so that the lines are directed upwards and to the right this deviation of the spine is favored by the inclination of the head to the left. The postures produced by too large a difference combined with the changes in the anteroposterior outline of the spine as a result of forward bending of the trunk are the most favorable to the production of scoliosis in the later years of school life, and the mechanism by which a curvature to the right in the upper region and to the left in the lower region is produced is the most usual. From the above considerations it follows that the difference should be such that the pupil can place the forearms comfortably upon the desk without raising the shoulders or sinking the head or back and that the injurious effects of the forward bending of the trunk are best prevented by such a minus-distance as would permit the trunk to be maintained in as near a symmetrically erect attitude as possible.

In order to overcome the objections towards a hygienically necessary minus-distance and at the same time to permit of greater ease

in sitting down and in rising to a standing position various forms of sliding and folding desk tops and sliding seats have been introduced. Of these the sliding desk tops are the most durable and practical and most universally employed.

As far as the limit of the minus-distance is concerned it should be such that the distance between the posterior edge of the desk top and the anterior surface of the seat-back permits of comfortable writing without allowing the back to leave the seat-back and should leave a small distance between the edge of the desk top and the body to prevent pressure upon the chest.

We now come to the last important feature of school furniture construction—the slope or the inclination of the desk top. In a consideration of this detail of school furniture construction questions of posture and of vision are closely interwoven. With desk tops adjustable for minus- and plus-distances, if the slope is insufficient the desk will be too high when the top is drawn back to make the necessary minus-distance required in writing, in which case the posture of the pupil will suffer. It will also be brought too near the eyes. The more nearly horizontal the desk top the more strongly must the eyes be turned downward in writing if the head is held vertically. This is accompanied by fatigue and for this reason the head is always rather bent in order to facilitate vision. The desk top should therefore have an inclination which will allow the eyes a free view. In order to put the least tax on the eyes the desk top should have such an inclination that the line of vision is perpendicular to it. With a good position of the head this slope should be about sixty degrees from the horizontal. However, this, although very desirable from the standpoint of vision, is for certain practical considerations impossible. With such an inclination, or even with one of thirty- to forty-five degrees as recommended by various authorities, things slide off the desk, the arms slide down or must be forcibly pressed against the desk. The greatest inclination practical from any standpoint is that recommended by the Vienna Commission,—fifteen degrees,—although the same objections hold good here. Even more preferable is an inclination ranging between six degrees and ten degrees.

In the foregoing pages I have gone over the principal general features of school furniture and the relation they bear, if faulty, to the production of faulty posture and permanent deformity of

the spine. The subject is not a new one and has received widespread attention at the hands of educators and physicians. The movement for the reform of school furniture probably had its origin in this country. In 1830 Mr. W. J. Adams of New York in his essay on "School Houses and School Apparatus" advocated the separation of the seats from the desks behind, the use of sloping desks of proper height and of individual seats with backs. In 1831 Dr. Wm. A. Alcott of Hartford recommended that each pupil be provided with a single seat and desk. In 1841 Barnard published his admirable work, "School Architecture," in which attention is called to the necessity for the correspondence of the height of seat and desk to the size of the pupil occupying it. He advocated the use of single desks and chairs, with a slope of the top surface of the desk and of a back-support reaching above the shoulder-blades and inclining backward as it rises. In Europe attention to the errors in the seating of school children was first called by Fahrner of Zurich. Subsequently Meyer, Cohn, Staffel, Schenck, Lorenz, and in this country Scudder, Hartwell, and Cotton, have contributed to the literature upon this subject.

The modern conclusions in regard to the principal requirements of school furniture may be briefly summarized as follows:

1. Adjustment for the height of seat and desk.
2. Adjustment of the desk top for minus- and plus-distance.
3. A seat-back furnishing an efficient support to the lumbar spine, reaching as high as the angle of the scapula and with a proper backward inclination.
4. A proper slope and depth of the seat.
5. A proper slope of the desk top.
6. Individual seats and desks of proper width.

In conclusion I wish to urge the necessity for systematic, intelligent supervision of the seating of school children, at least twice a year, and the more careful examination of pupils for faulty posture and especially for lateral curvature of the spine, since this, more than defects of vision or of hearing, is fraught with far-reaching consequences by reason of the alterations in the form of the thorax and pelvis. That such a necessity is being recognized is evidenced by the introduction into the Berlin public schools of orthopædic instruction for the prevention of curvature of the spine for children who show an improper carriage (*J. Am. M. Ass.*, Oct. 16, 1909).

Neurology

SYRINGOMYELIA WITH HYPERTROPHY AND ATROPHY *

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It is rather startling to find that the group of symptoms which we call by the single name *syringomyelia* and which, from what we know of its pathology, we rightly consider as a single disease should in some cases produce atrophy and in others hypertrophy. This is not surprising, however, when we recall the nature of the affection and some of the other symptoms that occur in it. For instance, it is not surprising in one case of syringomyelia that the power to feel heat sensations is lost, while in another the heat sense may be quite intact but the ability to distinguish cold may be entirely lacking. Occasionally the contact sense is well preserved, yet the pain sense may be quite absent. Corresponding differences with regard to other senses have been noted. It all depends on the portion of the spinal cord which happens to be affected. Syringomyelia has taught us the relation between these senses much better than we could have learned it in any other way. Until we had studied cases of the disease we were not absolutely sure about the distinctions in the sense of touch that now are so clear. According to the common sense of mankind heat and cold are different things and we think of them as such. The study of physics shows, however, that they are only degrees of the same thing, the amount of

* A clinical lecture delivered to the senior class of Fordham University School of Medicine.

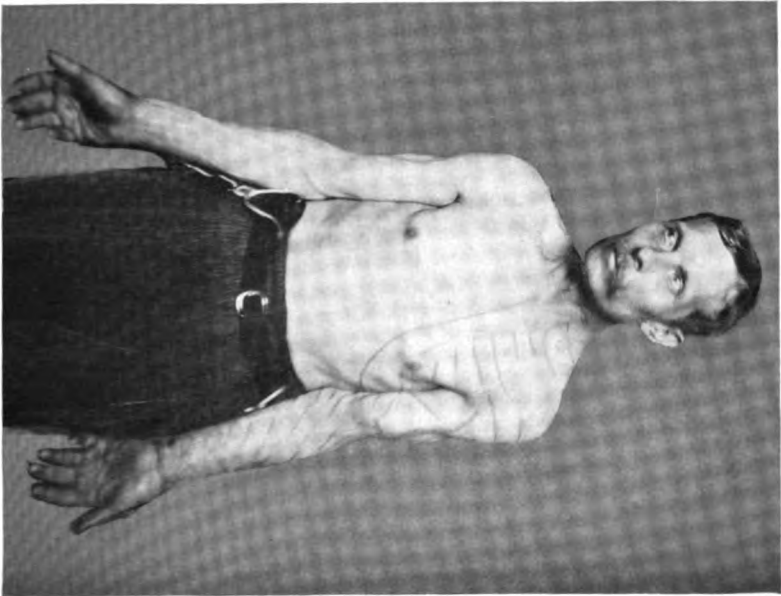
heat that a body gives off when touched. Since our study of syringomyelia we have realized, however, just why it was that we thought them two distinct things, since they are actually distinct sensations. Under these circumstances it is not surprising that syringomyelia should give us some new views with regard to the trophic influence of nerves and make us appreciate that atrophy and hypertrophy may be the results of very similar pathological processes affecting certain portions of the spinal cord and certain definite groups of fibres. Pathology is here once more teaching us physiology and biology.

A few years ago patients with hypertrophy of one or more extremities, or other parts of the body, in connection with symptoms of syringomyelia were described as suffering from acromegaly with accidental association of syringomyelia. These two groups of very different symptoms were then looked upon as not having any special relationship to each other. It was not until recent years that this combination of symptoms was recognized as due to the same lesion, syringomyelia. This condition has been given a special name by Schlesinger, 'partial macrosomia.' For the enlargement of the whole hand Hoffman and Marie have chosen the name 'cheiromegalia,' for the enlargement of the foot Schlesinger has suggested the name 'podomegalia.'

This interesting hypertrophy usually begins in one extremity, spreading from there to the trunk, or jumping to the other extremity. Sometimes it seems to involve the soft tissues alone; at other times, though much less frequently, it involves the soft and the skeletal tissues. The length of an extremity is not found increased as often as is the thickness, nor does the length increase as much, when modified at all, as does the thickness. In connection with hypertrophy of the tissue, arthropathies, curiously various, atrophic and hypertrophic are frequently found. There may be thickening of bones about the joints, hardening of articular ligaments, and, as in the case described by Nolbandoff, softening of the bones.

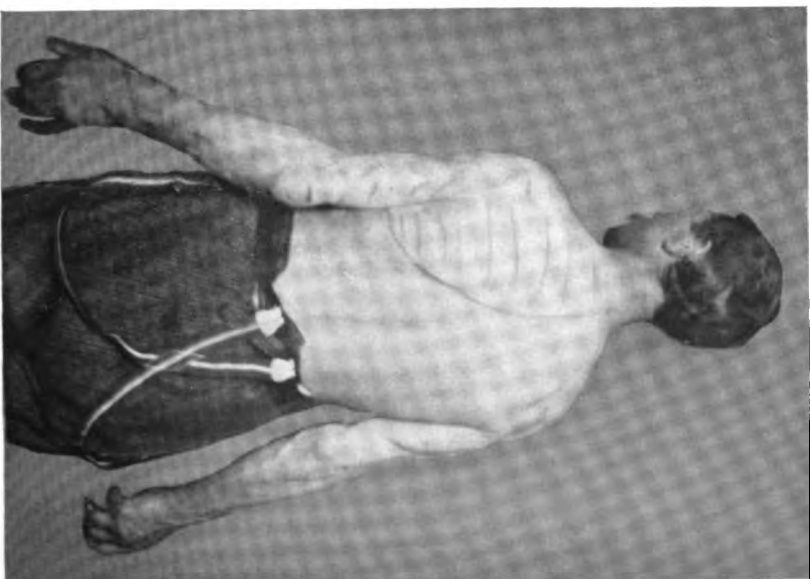
The patient whom I show you to-day (Fig. 1) shows the unusual and interesting combination of hypertrophy of an extremity with dissociation of sensation, and with a number of other interesting symptoms. His history from the dispensary records is as follows:

Fig. 1.



Hypertrophy and myringomycosis, front view.

Fig. 2.



Hypertrophy and myringomycosis, back view.

G. H., male, thirty-eight years old, married, has four healthy children. Father died of old age. Mother living and well, eighty-three years old. Three brothers and two sisters living and well. Two brothers died in infancy, cause not known.

Family history negative as to tuberculosis, nervous, or mental diseases, rheumatism, etc. No deformities in family. As a child and a boy the patient always enjoyed good health. Fifteen years ago he had a chancre with marked enlargement of the inguinal glands, which were very painful. He never had any further trouble from the chancre, but states that his wife had two miscarriages, and that one child died a few hours after birth.

The habits of the patient are good. Up to two years ago he was well. At this time he began to feel a heaviness in his left shoulder, and somewhat in the left arm. He paid no further attention to this condition until last December, about Christmas time, when rather suddenly his legs gave away, he felt "ill all over," as he expresses it, and went to bed. Immediately after this attack of indefinite illness, his left shoulder, arm, and hand began to swell to about twice their normal size. He had no pain in the swollen arm and hand, but some in the joints of the right arm and hand. The arm remained swollen for two or three months, after which the swelling began to subside gradually. Since this illness it has been somewhat larger than the right arm and hand (see Figs. 1 and 2). Immediately after the onset of the illness in December, patient began to have attacks of dizziness and during some of these attacks he would become totally blind in his left eye, the loss of vision lasting for about five minutes. These attacks of total blindness occurred four times on successive days. After the fourth attack the blindness was not complete. The loss of sight was confined to the lower half of the visual field; only the upper half of the left retina being involved. These attacks of partial blindness of the left eye gradually became less frequent, until now they occur about once a week, or once in ten days, accompanied always with dizziness. During the past summer patient noticed that, while during the hot weather the right side of his face would perspire very freely the left side would always remain dry. He was not sure about the absence of perspiration in the left arm and chest, although he thinks they do not perspire as much as the right.

Status Praesens.—Well-nourished man, not much adipose tissue, but muscles well developed. Symmetry of face not disturbed, except that the left eye is drawn back into the fossa somewhat more than the right, which, however, does not show well in the photograph. The left scapula has a lower position than the right, and recedes more from the vertebral column. The left half of the chest and back, the left arm and hand, are larger than the right chest, arm, and hand. This is clearly seen in the accompanying illustrations (Figs. 1 and 2). There is a slight double curvature of the spine; the upper convexity in the region of the sixth and seventh cervical vertebrae pointing to the left, the lower convexity of about the fifth, sixth, and seventh dorsal vertebrae, pointing to the right. The lower part of the body and the legs appear normal.

The measurement of the two arms and both sides of the body in the region of the chest are as follows: Middle of biceps, R., 28 cm. (11.0 inches); L., 30 cm. (11.8 inches). Over largest circumference of the lower arm, about 4 cm. (1.5 inches) below the elbow-joint, R., 18.5 cm. (7.7 inches); L., 20

cm. (7.9 inches). Hands with thumbs abducted, at base of first phalanx of thumb, R., 25 cm. (9.7 inches); L., 26 cm. (10.2 inches). Over base of first phalanges of hands, thumb abducted, R., 22.5 cm. (8.8 inches); L., 23 cm. (9.1 inches). Length of middle fingers from base to tip, R., 11 cm. (4.3 inches); L., 11.5 cm. (4.5 inches). Length of ring finger, R., 10 cm. (3.9 inches); L., 10.5 cm. (4.1 inches). Length of little finger, R., 8 cm. (3.1 inches); L., 8.5 cm. (3.3 inches). Chest, from spine to middle of sternum over the nipple, R., 45 cm. (17.7 inches); L., 46.5 cm. (18.3 inches).

There is complete loss of the pain and thermal senses over the whole left arm and hand, and on the surface of back and chest, neck, and back of head, as indicated by the shading in the illustrations (Figs. 1 and 2). On the chest, the area in which the thermal sense is lost is smaller than the area of analgesia as indicated by the second line. Tactile and muscular senses not disturbed. No sensory disturbance in the trigeminal region or on any other part of the body. The skin reflexes are present. The tendon reflexes of the legs, right arm, and jaw are slightly exaggerated. Tendon reflexes of the left arm are very much diminished. The patient was placed in a hot-air chamber and allowed to perspire freely. It was seen that on the left side of the face there was no perspiration, whereas on the right side there was profuse perspiration, the line of demarcation being sharply drawn down the middle of the face. The left arm and hand, the left side of chest and back were moist, whereas on the right side, on the same areas, the perspiration was very profuse.

The bones of the left wrist-joint seem enlarged. There is permanent dislocation of the carpometacarpal joint of the thumb, which cannot be replaced. This dislocation may be seen readily in an X-ray picture. The strength in both arms and hands is equal, but in comparison to the muscular development the strength seems to be diminished. Both hands register 80 on the dynamometer. Nowhere is there seen any muscular atrophy or paralysis. A paresis of the left rhomboidei and levator anguli scapulae, however, is found.

Pupils equal; react to light and accommodation. Movements of the eyes normal. Visual field normal; normal fundus; physiological excavation of the papilla; left eye-cleft smaller than right; left eye deeper in fossa than the right.

Lungs: normal.

Heart somewhat enlarged. Loud systolic murmur heard at apex, transmitted to all parts of the left chest. Mitral insufficiency. Blood-pressure equal in both arms, measuring 120 mm. (4.7 inches) at systole, and 83 mm. (3.3 inches) at diastole.

Skin temperature equal on both sides. All other organs apparently normal. Taste, smell, and hearing normal.

For a year previous to the acute attack which the patient had in December, 1904, his left arm felt numb and not the same as his right arm, although he did not know that the pain and thermal senses were absent until the examination was made at the clinic. It seems probable, therefore, that the loss of the pain and the ther-

mal senses has been coming on gradually for at least one year previous to the acute attack. This attack was, no doubt, brought on by a hemorrhage in the area of the gliosis, or in the necrotic tissue, the result of a central gliosis (for such I take the lesion to be). It would appear that the hemorrhage confined itself to the intermediate gray matter at the base of the left anterior horn throughout a number of segments: first cervical to about the sixth dorsal. Two sets of symptoms resulted from this hemorrhage: irritative and paralytic.

As irritative symptoms must be considered the attacks of blindness of the left eye, and with this blindness the dizziness. These attacks were no doubt caused by an irritation to the sympathetic centres in the cervical region, causing spasms of the blood-vessels of the left retina, with resulting dizziness. These irritative symptoms have gradually subsided since the onset of the acute attack. An interesting feature, to which attention should be directed, is that when the irritation was most marked, all the blood-vessels of the retina were involved in the spasm, but as the irritation subsided the spasm involved only the blood-vessels of the upper half of the retina. The correct interpretation of this peculiar phenomenon is, no doubt, that the motor impulses from the intermediate gray matter of the cord passing through the cervical sympathetic to the upper half of the eye come from cells that have a different position from that of those cells which supply the blood-vessels of the lower half of the retina.

With the paralytic symptoms must be classed the anidrosis of the left side of the head, the enophthalmus (paralysis of the orbitalis), and the œdema of the hand, arm and shoulder, caused by the paralytic dilatation of the blood-vessels in these parts. It is very probable, likewise, that an enlargement of the area of analgesia and loss of the thermal sense took place after the hemorrhage, although this could not be demonstrated, as it is impossible to know how large the area was in which the pain and thermal senses were missing before the acute attack.

Before the appearance of the œdema in the left arm and shoulder the patient is positive that there was no difference in the size of the arms. It seems, therefore, that the hypertrophy began to develop sometime during the existence of the œdema. This being

the case, is there any connection between the œdema and the subsequent hypertrophy? I am inclined to think that there is, although it would have been desirable and important to know whether all tissues were involved in the process of hypertrophy, or whether there was an increase only in the connective tissue as the result of catabiotic changes. I suggested to the patient that pieces of different tissues of the arm be removed for histological examination, but this was refused. It seems that the bones are involved as well as the soft tissue; not so much in the increase in their size, as in the greater opacity of the affected bones, possibly due to an abnormal amount of salts deposited.

In many of the reported cases of partial macrosomia, the hypertrophy is either preceded by phlegmonous conditions with œdema, etc., or by œdema due only to the paralytic dilatation of the blood-vessels, as in the above case. In the cases where this factor has not been mentioned, it is possible that it has been overlooked, as no importance was attached to it.

Before endeavoring to point out the connection between the œdema and the subsequent hypertrophy in the above case, it is perhaps advisable to state very briefly the prevailing opinion held at present concerning the cause of hypertrophy of tissue. It is generally conceded that a living cell is capable of developing three physiological activities: functional, nutritive, and formative. Formerly it was supposed that these three activities were the result of a direct stimulation. This, as has been pointed out by Weigert, cannot be the case, for the functional activity is a translation of the energy stored in the cell-body and nucleus, into the specific energy of the cell in question, and attended with a breaking down of the cell element. The nutritive and formative activities are the diametric opposite of this, a replenishing of the broken-down elements and growth or multiplication of the cell. The former, or functional activity, has been given the name 'catabiotic process'; the latter, or nutritive and formative activities, the 'bioplastic process.'

In the undeveloped individual, as in the undeveloped cell, the relation of different parts of the whole to one another is such that an equilibrium throughout the whole does not exist, or in other words, the tissue tension has not reached the point where it inhibits the bioplastic processes, so that they will continue until this equi-

librium is established, after which the bioplastic energy will be forced into a dormant state. Should this tissue tension, either in the individual cell, or in the individual as a whole, again be disturbed, the bioplastic process will again flare up, and growth will continue until the amount of tissue tension develops which will again inhibit growth. The equilibrium in the individual cell is disturbed every time a cell is stimulated physiologically whereby substances are removed from the cell (catabiotic process) which can be, and are, normally replaced readily by the nutritive or bioplastic process, thereby re-establishing the equilibrium. It often occurs that by a pathological irritation more intense than a physiological stimulus, the tissue tension is disturbed to such an extent that not only the nutritive but also the formative activity will be liberated, and we then have cell-division and growth beyond the replacement of normally disturbed tissue to hypertrophy. This growth of tissue is due to the bioplastic process.

There is, however, another way by which the amount of tissue can be increased, and that is by the catabiotic process. If a muscle cell is stimulated it will contract, thereby developing measurable energy and heat; if a gland cell is stimulated, it will secrete a substance characteristic of itself. If a connective-tissue cell is stimulated it will deposit an intercellular substance (connective-tissue fibres), or in case of osteoblasts, calcium deposits in bones, the result of the catabiotic process. So it is evident that we can have increase of a certain kind of tissue (connective tissue) as the result of a catabiotic process.

In the above case, is it not probable that the hypertrophy is the result of a disturbance of tissue tension, which in turn was brought about by the œdema caused by the paralytic dilatation of the arteries in the tissue involved? Ribbert has expressed the opinion that tissue tension can be disturbed by a simple hyperæmia, the result of which is an hypertrophy of the tissue involved. A pupil of Ribbert, E. Feurst, has taken up this subject, and has succeeded in producing a hyperæmia with a subsequent hypertrophy of the tissue involved, by exposing tissues to low and high temperatures. Feurst, however, is of the opinion that it is not the hyperæmia alone that causes a disturbance of tissue tension, but that pathological changes in the cells, brought about by exposure to the low or high temperature, are a factor in disturbing tissue tension. In the above case

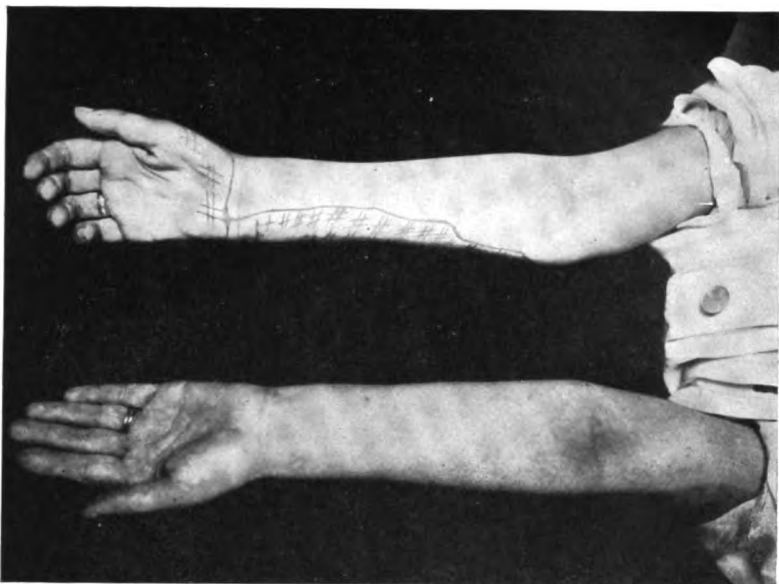
the factor of pathological changes in the tissue due directly to the effect of the low or high temperature in bringing about a disturbance of tissue tension can be excluded; instead, we have a paralytic dilatation of the blood-vessels with œdema caused by a lesion lying remote from the tissue hypertrophied and therefore in no way affecting it directly. This is, therefore, that ideal condition to which Ribbert has referred as being so difficult to produce experimentally, viz., the production of a hyperæmia in a tissue without injuring the tissue directly by the agent which produces the hyperæmia.

The present case may also bear upon the theory of special trophic nerves, but it seems to me that there is not sufficient evidence in support of this theory to call for a discussion of it in this connection. The study of this case is by no means complete, as it is impossible for me to ascertain the nature and extent of the hypertrophy, as histological sections of the tissue could not be made; but it seems probable that we have a tissue hypertrophy, the result of the bioplastic, as well as the catabiotic process.

The second case, which illustrates atrophy of muscles in connection with syringomyelia, is a much more typical example of this nervous affection as it is familiarly known. It has most of the outspoken signs of the dissociation of sensibility which is so characteristic of the disease. It occurs in a comparatively young woman, and most of the patients suffering from this disease are young though perhaps fewer of them are women than men. In this as in the other case the member affected is the upper extremity, and this too is the more frequent seat of the disease. This case is particularly interesting because, as I pointed out some years ago when first writing it up with Prof. James J. Walsh in *The Medical News*, it is one of the few cases in the literature in which there is a sufficiently complete history to enable us to determine when the original lesion, the progress of which is so clearly marked in the atrophic condition, and the disturbance of the sensibility now present began the degenerative process in the cord. We usually see only the end results and the beginning is shrouded in obscurity. Here we have a glance also at the origins of the disease.

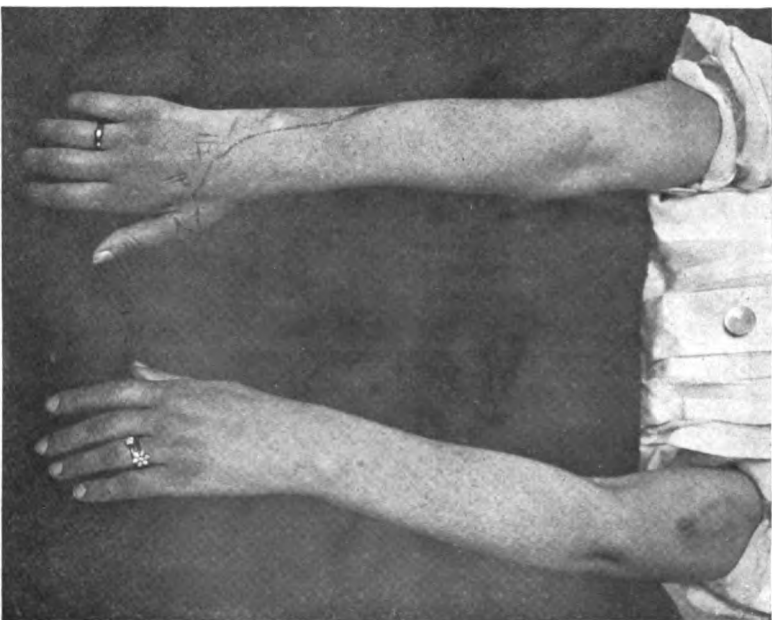
The patient is a young woman of about twenty-eight years of age, who came to the outdoor department of the Presbyterian Hospital some five years ago presenting well-marked symptoms of

FIG. 3.



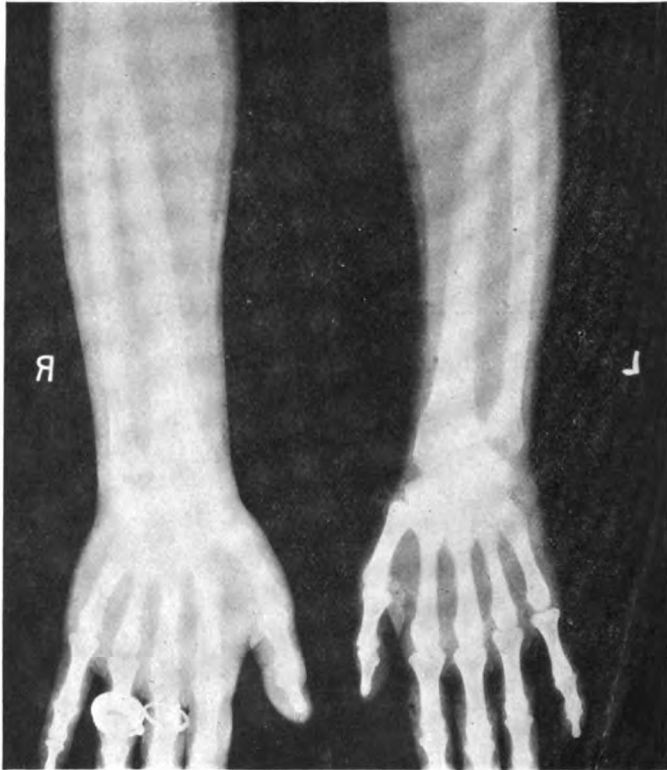
Atrophy in syringomyelia, front view.

FIG. 4.



Atrophy in syringomyelia, back view.

FIG. 5.



X-ray picture of atrophy in syringomyelia. The atrophy involves all the tissues of the hands, even the bones, as may be seen, especially in the bones of the thumb of the left hand as compared with that of the right.

syringomyelia in her left hand (see Figs. 3, 4 and 5). Apart from this condition she is now quite healthy, but she recalls distinctly that some eighteen years ago she suffered from an attack of weakness and paralysis in this same arm. She does not remember exactly all the details, but thinks that this came on rather suddenly and at a time when she was perfectly well just before. On close questioning, however, she confesses that she had about the same time what she calls a "rising on her face." This, manifestly from her description, was a large boil. The possibility of its having something to do with the condition which developed is slight, but as we shall see a little later, a direct connection does not seem at all likely. She remembers that this weakness of her arm came on suddenly, and that she was unable to use her hand, especially for such finer movements as picking up pins, coins and the like. Her fingers were especially affected. The paralysis that occurred, however, involved the whole arm as far as the shoulder, for she could not use the arm at all. Previous to this illness she cannot remember having suffered from any other serious affection, and she does not even seem to have had the ordinary diseases of childhood. Her arm gradually regained its strength and at the end of three or four months she could use it as well as ever. Before the end of six months no trace at all was left of the paralysis.

Some ten years later, that is about eight years ago, when she was about 20 years of age, she began to notice that her hand trembled considerably after doing any work. She found it practically impossible to hold the fingers still at times. Increasing weakness became manifest and she found it difficult to do many things that she had been familiar with for years, and had gradually to learn the use of her left hand to replace her right. Her hand was inclined to be cold and during cold weather was tremulous and very weak. During the winter time it was often so numb that she could not use it at all.

Three years ago she noticed a wasting of the muscles of the hand, those of the ulnar side of the hypothenar eminence becoming especially flattened. This wasting spread with gradual diminution of the size of the thenar eminence and with distinct wasting of the interossei muscles. Her fingers began to be overextended in the proximal phalanges though with flexion of the distal phalanges giving a characteristic appearance of beginning claw-hand.

The present condition as regards the muscles shows the flat hand of atrophy of the hypothenar and thenar eminences, both having disappeared, and the distinct beginning of main en griffe. In the affected area, which extends somewhat above the elbow, there is some temperature sense disturbance, but this is comparatively slight. The pain sense, however, is seriously disturbed and over an area some eight inches long on the ulnar side of the forearm there is complete analgesia. In this same area she feels touches very well and recognizes heat better than cold. This dissociation of sensation points, of course, to disturbance of the sensory tract immediately surrounding the central canal in the lower cervical region and makes it evident the diagnosis of peripheral symptoms of syringomyelia.

The interesting problem in this case is the etiology of the condition. It has generally been conceded that syringomyelia develops either on a basis of some congenital malformation of the cord or on a hæmatomyelia, either spontaneous or traumatic. Even where the predisposing element in the case is a congenital lesion it is usually considered that a hemorrhage taking place into the cord constitutes the first step in the further progress of the case that eventually leads to the appearance of the characteristic peripheral symptoms.

The occurrence of the first paralysis of the arm fourteen years before the present condition and over ten years before the first symptom of syringomyelia was noticed, seems to make it clear that we are not in the presence of a congenital malformation as the basis of the condition which has developed. The complete recovery from the first attack and the long interval of absence of symptoms would seem to preclude the possibility of there having been a serious defect in the cord which predisposed it to a hemorrhage or some other pathological lesion at the time of the first set of symptoms. The symptoms that developed on that first occasion point to the occurrence of a hemorrhage or thrombosis or embolism. To consider them in their reverse order, embolism seems unlikely because the source of it will usually be found in some affection of the endocardium and there is no history of endocardial trouble, and an examination of the heart at the present time reveals no signs of an old endocarditis. With regard to thrombosis the question is less easily disposed of. At the time that her first set of symptoms

developed she was suffering from anæmia. She has, indeed, during the most of her life, been rather poor in blood. It is well known how often it happens in anæmic cases that a sort of spontaneous thrombosis occurs. If the blood-vessel to a portion of the cord were shut up in this way the result would be a necrosis of surrounding tissue quite as effectually as if there were a hemorrhage.

It has come to be usually considered, however, in these cases, that a hemorrhage is the most likely preliminary lesion on which the subsequent developments take place. This may be either spontaneous or traumatic. Spontaneous hemorrhages are quite possible and have been noted in a number of cases. Often there is a suspicion of trauma, but this cannot be determined, owing to the defective history. If a hemorrhage be supposed to have occurred in this case, there came as a result an overgrowth of connective tissue which contracted into a scar. The irritation set up by this led to the development of gliosis of the cord, affecting mainly that portion of the cervical cord lying around the spinal canal on the left side. This would afford a very satisfactory explanation of the condition which has now developed. With regard to the possibility of an infection from the boil on her face which seems to have existed at the time of the primary paralysis, it may be said that if there were an infectious embolus at that time in the cervical portion of the cord, it would surely have caused secondary infection in the neighboring area, and this would have produced a more lasting and more extensive set of symptoms than was observed.

There is one important point in the treatment of these cases. Owing to the dissociation of sensibility they are likely to suffer from various lesions, especially from burns and at times from rather severe trauma in the affected part. Owing to the lowered condition of the trophic nerve supply to the part these injuries heal very slowly and are rather resistant to all ordinary treatment. It is important then to warn patients suffering from beginning syringomyelia of the necessity of taking the greatest possible care of the affected member, in order to avoid the accidents to which it is liable because of the disturbed sensory condition of the part. Beyond this there is not very much to be done and of course the outlook is absolutely unfavorable, since there is no hope of any decided improvement, to say nothing of cure.

Miscellaneous Topics

THE BOOK-PLATES OF PHYSICIANS, WITH REMARKS ON THE PHYSICIAN'S LEISURE-HOUR "HOBBIES"

BY ROLAND G. CURTIN, M.D.

PHILADELPHIA

IN my title, you will observe that I use the term "The Book-Plates of Physicians." It would not be proper to call them all medical book-plates; for over one half of them have nothing relating to medicine, symbolic, or otherwise, in their designs. The collection of book-plates is a fad, or "hobby"; so that it seems proper at this stage to say a few words in reference to the "hobbies" of physicians.

In the latter part of the doctor's life, at a time when the shadows are lengthening and his strength is declining, he is obliged to give up some of the drudgery of practice. It is then that he has a little spare time, and he feels the necessity of some light interest to occupy and divert his jaded mentality, something to vary the routine of his treadmill labor; for his brain has been constantly occupied during his period of activity, when he was on the alert day and night, weighed down by the great responsibility of sometimes having human lives hanging in the balance, in arranging the visits to his patients so that all may be pleased, enduring the strain of operations, and remembering the idiosyncrasies as to medicine and the other peculiarities of the patients, as well as the other details, many of which are known only to the practitioner. This is not all; for he is expected to be up with all the advances of medical science. All this load of care and worry becomes heavier as years go on; and the time comes at last when he has to take at least a partial rest. In order to do so, he must have something to occupy his mind—something that will amuse him, change the current of his thoughts, and help him to

pass his leisure hours in an agreeable and pleasurable way. Then it is that he is apt to take up some attractive "hobby" as a mental diversion—one that will not tire him or exhaust his waning strength, but of sufficient interest to divert his attention pleasantly from medicine for the time being. Devotion to practice is a doctor's first duty, but recreation is also important, as it is essential to maintain health by relaxing and easing up occasionally.

Every one who has been untiringly occupied in a prolonged and laborious occupation has some pleasurable work that he has set aside for the future, when he will have leisure. This may be anything that pleases his fancy so long as it is a change of occupation. It prevents that dwarfing of the mind which is often the result of keeping too long "in a rut." A collection of books may interest him and engage his mind, or a collection of objects of almost any kind. Curiosities, relics, botanical or geological specimens, minerals, or collections relating to any branch of natural history or science may attract him; or he may like art, music, or literature. A love of the latter is one of the most commonly used comforts of advanced life. Almost all "hobbies" require more or less books descriptive of the subject, and these special collections often become the future foundations of public libraries or valuable additions to them.

The study of medicine obviously leads to the study of man, and of his life and labor, past and present; so that anthropology, or the science of man, rationally considered, and its branches, are subjects frequently selected by physicians as interesting studies. Among its branches are ethnology, a study of racial history, and also of families, ancient and modern; and archeology, which is a study of the relics of the past industries or the human family. You will notice that medical men are or have been engaged in almost all parts of the world, searching for knowledge even in the unexplored regions—searching for the Pole, like Dr. Elisha K. Kane, and Dr. Hayes, both graduates of the University of Pennsylvania; or making collections for museums; and adding, by observation, to our knowledge of the previously unknown world; they have girdled the globe, navigated strange oceans, ascended the highest mountains, penetrated and explored unknown regions, and tropical fastnesses.

In taking up a fad, I would suggest that you have a congenial "hobby," with two "don'ts": first, do not allow it to overtop your professional interests, but use it as a relief to your mind when at leisure; second, do not put off the incipient stage until too late in life. Everybody should have a fad as a balance to his mind. It is absolutely necessary for the busy mind, for you may become too much absorbed in medicine or too old to take the initiative, being too "stale," like the proverbial "Jack," who became dull from too constant employment. The Rev. Phillips Brooks said: "Be interested in some pursuit which will take you into quite unfamiliar fields. Make yourself at home in the Public Library." Proper "hobbies," those that will interest, will extend your horizon; and the possession of general knowledge is often of the greatest value to the physician. To illustrate: an old doctor in my native town said to me, on the eve of my going into practice: "Doctor, talk learnedly about Rome, Greece, or any subject except medicine, to your patients; and you will have less to take back and regret." Do not speculate or make doubtful prognoses, don't specify your doubts and suppositions; or, in other words, do not think out loud, for the young man who freely prognosticates is always in trouble. The best informed man is the one that usually shows off to a good advantage in any walk in life; he knows when to talk and what to say. Non-medical information is often of great use to the doctor, as he is expected to answer all scientific as well as medical inquiries. It broadens him intellectually and enlarges his sphere of usefulness.

Dr. Samuel Johnson said perfect good breeding consists in having no particular mark of any profession. By the way of illustration, a few examples may be given of various non-medical occupations of prominent physicians:

Prof. Richard Caton, M.D., of Liverpool, has, for over thirty years, employed his leisure time in summer in studying the *Æsculapian Temples of Greece* at Epidaurus, Athens, and Cos. He has written a number of books on the subjects. He is held in such high esteem in his own great city, that his neighbors have recently elected him Mayor of Liverpool.

The late Prof. George B. Wood, M.D., of the University of Pennsylvania, had a large conservatory in which he raised medical

plants with which to illustrate his medical lectures. He spent his summer vacations in long drives about Pennsylvania and the neighboring states, in a flashy equipage that attracted general attention. Dr. S. Weir Mitchell, the well-known neurologist, scientist, and author, of Philadelphia, honored at home and abroad, after a long and useful life in medicine, now employs much of his leisure in writing novels of great popularity and poems that are brilliant. The late Oliver Wendell Holmes achieved an international success as a poet and novelist, writer and wit. A collection of his writings fills thirteen volumes. The late Dr. Joseph Leidy was a justly celebrated all-around naturalist in his prime, and is acknowledged to have been the greatest paleontologist that ever lived. Two daring-spirited graduates of the University of Pennsylvania were pioneers in exploring the arctic region: they were Dr. Elisha Kent Kane and Isaac Israel Hayes. They took their lives in their hands and penetrated latitudes before untraversed, reaching latitude $80^{\circ} 30'$ in 1854, and returned well laden with interesting knowledge, surviving dangers which often seemed insurmountable. Kane was buried in Laurel Hill, Philadelphia, the city in which he was born. Dr. Hayes, a native of Chester County, Pennsylvania, surgeon in the Civil War after 1861. They twice went gallantly to the Polar region in search of the ill-fated explorer, Sir John Franklin. Dr. Samuel Morton, of Philadelphia, during his life made a collection of skulls and wrote his book, entitled "*Crania Americana*." The collection forms the basis of the largest collection of skulls in the world, which has found a home in the Academy of Natural Sciences, of Philadelphia. Dr. Morton is still quoted as an authority on the skulls of America. He was the owner of a handsome heraldic book-plate, a specimen of which I have in my collection.

Among English physicians may be mentioned, as noted examples, the following: Dr. Richard Caton, of Liverpool, who has already been mentioned, and the eminent Dr. Parry, who studied art, music, and poetry, while attending the nobility. He also wrote a book upon the Fossils of Gloucestershire, and made a large and valuable collection of minerals. Jenner, "the celebrated," of vaccination fame, loved his violin and flute; and Dr. William Hunter, a practitioner of note, the brother of Sir John Hunter, collected coins.

The celebrated Dr. Lettson visited jails for charity's sake, and raised up the fallen and released the innocent, and warned the careless amateur in crime. Richard Bright, M.D., was a collector of engravings. Smollett and Locke were medical men and were well known as eminent writers. Dr. Oliver Goldsmith wrote the *Deserted Village* and the *Vicar of Wakefield* in Canonbury Tower, while hiding from his creditors. Keats was a medical student; but his love for poetry was so strong that he was lured away from medicine. Dr. John Walcott was a great poet, writing under the nom-de-plume of "Peter Pindar." Dr. T. Morley wrote "*Pallis the Potter*" and the very interesting history of the late Dr. Jerome Cardan. Dr. Dover—he of "Dover's powder" fame—was a great traveller. He joined the Buccaneers, and went on an expedition to the "South Seas" as an under officer, with Captain Rogers, and there amassed a large fortune. He was visited, while anchored off the Island of San Juan Fernandez, by Alexander Selkirk (Robinson Crusoe). After returning to England, he settled down in London, where he became a very successful practitioner. Dr. Richard Mead (1673-1754) was physician to George II. He it was who was instrumental in inducing the wealthy Mr. Guy to found and endow the great Guy's Hospital at London in 1725. Dr. Mead wrote much, and was very fond of poetry. He foreshadowed the theory that certain diseases have their origin in germs. He said that the plague and certain fevers come from seed sown in the individual. Sir Hans Sloane, M.D., collected a great library, numbering fifty thousand volumes, and possessed twenty-three thousand medals and coins, besides works of art, specimens of natural history, all costing him over \$250,000. He gave these collections to Parliament, and they formed the nucleus of the great British Museum, the largest and most valuable collection in the world. Dr. William Gilbert was the author of *De Magnet*. Dr. Mason Good was a great linguist and a noted physician. Dr. John Brown, who wrote the beautiful and touching story, "*Rab and his Friends*," was a prominent Scotch physician.

In Germany, the great Professor Rudolph Virchow spent much of his leisure time in investigating the palace of Agamemnon. He, too, was at times active in statesmanship, being a prominent leader in German legislative politics. Billroth was a pianist

of considerable note, and Strümpell was an excellent violinist. Many other examples could be given did space allow.

In the history of our country, we find that physicians have been active and efficient as statesmen, and that some achieved elevated positions. Six physicians signed the Declaration of Independence, and twenty-two were members of the Provincial Congress of Massachusetts. Doctor Samuel Pritchard, of Concord, Massachusetts, took part in the midnight ride of Paul Revere on April 18, 1775. They spent the night in the saddle, galloping from Boston to Concord, stopping at every farm and hamlet, warning the people, and urging them to oppose the march of the British troops. To this cry, the "Middlesex farmers" responded; and the result was the Battle of Lexington. President William Henry Harrison was a medical student, and afterward a gallant soldier and later a worthy Chief Magistrate. During the Civil War, Major General Crawford was a gallant and efficient officer; as was also General Wood, in the Spanish War, and Major General Ainsworth, who is now the Adjutant General, U. S. A. Each of these gentlemen entered the service as a medical officer. Dr. William Walker, son of a Scotch father and a Kentucky mother, was born in Tennessee in 1804, a soldier of fortune, practised medicine at his home and later in Philadelphia, Nashville and New Orleans; he was educated at Edinborough town and the Continent. When the gold excitement broke out he was a "Forty-niner" and on the Pacific Coast became a law student, then a journalist, was wounded in a duel in 1853; he was found in the conquest of Sonora and Lower California. In June, 1855, with a band of 58 men went to Nicaragua to fight as a liberator with the democrats of Leon against the aristocrats of Granada to establish a republic. He was captured and shot September 25, 1860.

The guillotine, a machine which was used to decapitate persons in Paris during the "Reign of Terror," was the suggestion of a French physician named Guillotine. The instrument was perfected by another physician, Dr. A. Louis, also a Frenchman.

Speaking of physicians as being active in warlike pursuits outside of medicine, I may mention that in a conversation with Dr. Gatling, the inventor of the "Gatling Gun," I asked him how he came to invent the gun. He said: "After a great battle, I was

in the depot at Indianapolis, where I was engaged in practice, and saw the great number of coffins containing the dead bodies of soldiers. It occurred to me that the proper way to shorten war was to make it as dreadful and dangerous as possible; and I determined to try to invent something that would slaughter so many in the first engagement that the combatants would wish to stop the war, and thus prevent the greater number of deaths from disease incident to long-continued camp life, and thereby save many lives. I went to work at once, and developed the gun that bears my name." This invention is like most of the great inventions in this world, they are generally made by those outside of the environment of the work to be accomplished. This is easily explained; as outsiders (Prof. S. P. Thompson calls them amateurs) are not trammelled by the previously conceived ideas of the way the work is usually done, they look upon the subject from an independent point of view.¹

These are a few examples of how some prominent medical men have become eminent or useful citizens in other than medical lines. Many medical doctors have been and are still engaged in agricultural pursuits, or flee from the realms of practice into the quiet forest, to live or to camp, hunt, and fish.

Collections made with judgment may enhance in value and become a rich asset to a physician's estate.

A doctor in Philadelphia, who was a noted collector and an authority on the subject of autographs, engravings, portraits, and numismatics, was standing one day with another physician and myself, and the following conversation took place: the physician said to the collector: "Why do you want to put all your spare time and money into these old things? Why do you not enjoy the money and have a good time?" The man with a "hobby" said: "You have your pleasures with your money convivially. It is spent and gone. I spend my money for '*these old things*,' as you call them. When you die, what will be left for your family? When I die, '*these things*' will prove a good investment, and will yield to my

¹ Sir William Herschell, the astronomer, was a music teacher, and Dallinger, the authority on the microscope, was a clergyman, and William Sturgeon, the inventor of the electromagnet, was a shoemaker.

family monetary value greater than I could have left them in any other way; and just think what a pleasure it has been to me to gather them! I shall probably live longer than you, and be quite as happy. I like my way the best, and you are probably satisfied with your way." When he died one of the collections that he had made with little cost, being obtained largely by exchanging specimens with other antiquarians, sold for over a thousand dollars.

As I have already said, "hobbies," or fads, lead to the collecting habit; and the collecting habit in individuals often results in the foundation or building up of our libraries or museums, as in the cases of Dr. Mead and Dr. Morton; and others might be mentioned, such as Dr. Thomas B. Wilson, of Philadelphia, who placed the Academy of Natural Sciences, of Philadelphia, upon a firm basis, by adding to it the second largest collection of birds in the world, and by substantial financial support.

The students of Archæology, history, art and science all go to the library to study the fashions of the past and their beginnings.

The quiet man in the alcove is the man who appreciates the collection as an aid in his studies. He goes from one country to another to collect material for his observations on the past work, etc., of those long passed away.

The British Museum is visited by scholars and students of the whole civilized world. The professors of our universities are constantly asking for permission to visit foreign collections to make special study of some particular subjects which interest them. Most of their time is spent in the library or museum.

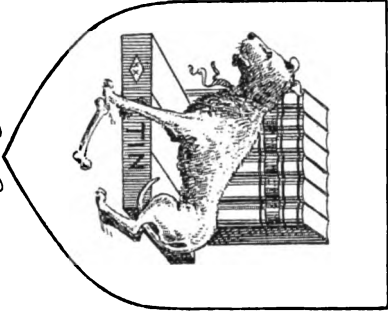
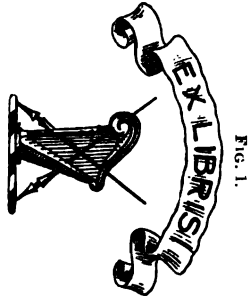
Some people do not look upon museums and libraries with the same favor, as is shown by an extract from the will of Edmond de Goncourt: *Translation*—"My wish is that my drawings, my pictures, my curiosities, my books; in a word, those things of art which have been the joy of my life—shall not be consigned to the cold tomb of a museum, and subjected to the stupid glance of the careless passer-by, but I require that they shall all be disposed under the hammer by the auctioneer, so that the pleasure which the acquiring of each one of them has given me shall be given again in each case to some inheritor of my own tastes." This certainly is a selfish and thoughtless view of the subject. If we had no museums, where would the student of to-day get a knowledge of the past. The

value of a public collection should not be measured by the visits of the common sightseer who visits a museum in order to say he has been in the building or to have a secluded place to meet a friend or lover.

Dr. Johnson wrote on the collecting habit as follows: "The 'pride' or the pleasure of making collections, if it be restrained by prudence and morality, produces a pleasing remission after more laborious study, furnishing an amusement for that part of life (the greater part of many lives) which would otherwise be lost in idleness or vice. It produces a useful traffic between the industry of indigence and the curiosity of wealth. It brings many things to notice that would be neglected and, by fixing the thoughts upon intellectual pleasures, resists the natural encroachments of sensuality and maintains the mind in her lawful superiority."

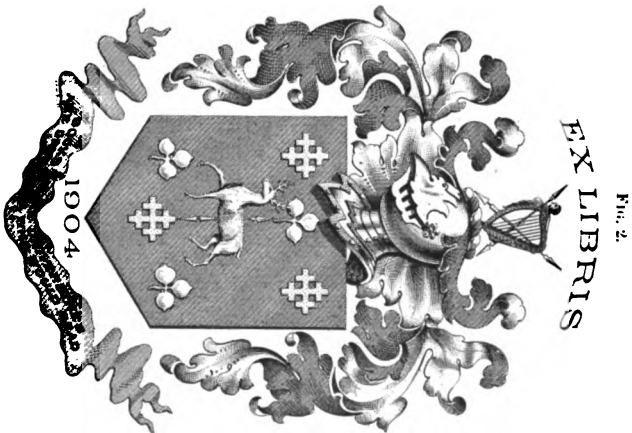
One physician in Philadelphia collects canes; another one raises fancy fishes; and still another collects Indian relics; and as almost all physicians have some amusement outside of medicine, this list might be greatly extended. I have personally made quite a number of collections in my time. The four most important, outside of natural-science specimens and book-plates, are of Continental currency, autographs, Indian canoe-paddles, and sharp-pointed weapons—consisting of lances, pikes, javelins, spears, swords, cutlasses, bayonets, stilettos, daggers, knives, etc. Many years ago, I was under the impression that I was through with all these fads; but the collection of book-plates was thrust upon me unconsciously.

In 1894, having a goodly number of books, and having tired of my own chirography, which I knew diminished the value of my books, I personally designed a plate, which was emphatically home-made, and had a zinc copy executed (called zincotype). The design was awfully and frightfully original. I say this in order to protect the eminent *ex libris* artists throughout the world. It was as follows: At the top was placed the Curtin crest, a harp with two lances crossed. Beneath it, in an armorial shield, I had a mongrel dog—a *cur*—standing in front of a box of double X *Tin*; the combination making *Curtin*, making a rebus plate. In the background were a number of books, and beneath them was my name. (Fig. 1.)



Richard G. Burton, M.D.

A rebus, ranting, or joking plate.



Richard G. Burton, M.D.

Armorial plate.

This crude plate I placed in my books. I showed a lady my joking plate. She looked at me vaguely and inquiringly, and I asked her whether she recognized the joke. She said: "No, I don't." I then asked, "What kind of dog is represented in the plate?" She replied, "I should call it a mongrel." I then asked, "What is the other name for a mongrel dog?" She promptly replied, "A board-yard dog." I asked her if they ever called such a dog a *cur*, and whether she did not see it standing by a box of XX *tin*. "Now put these two together," I said, "and what do we have?" She promptly replied, "Tinker." The man who said, "My goodness, what game we see when we have no gun!" was a wise and thoughtful man.

About two years after I had begun to use these plates, a flood of elaborate and artistic book-plates came floating in from England, Germany, Norway, Russia, France, Switzerland, Italy, Spain, Portugal Canada, and the United States, accompanied with the request that I exchange book-plates with the senders. This zincotype plate of mine, which I have described, was what would be called a punning, joking, rebus, or canting plate. My wife said to me one day: "Are you not afraid of being incarcerated in the penitentiary for sending such a miserable, cheap production in exchange for those beautiful works of art that are being sent to you from abroad?" Feeling that danger and disgrace were impending, I, in 1903, secured another, a steel plate, which was purely armorial—the Curtin coat-of-arms. Instead of the usual motto, I placed the legend, "Books unlike universities, are open to all who would learn." It was engraved by Mr. Robert B. Keesey, of Philadelphia. (Fig. 2.)

I have now over fifteen hundred plates, among which are about two hundred and fifty doctors' book-plates, a study of which will be the basis of this paper. The illustrations, with but one exception, are taken from my collection.

As a preliminary to the study of medical *ex libris* it may not be amiss to allude briefly to the history of the earlier book marker. This begins with printing, or about 1470, although there is in the British Museum a small pottery or clay tablet that was used as a marker for the papyri of the ancient Babylonians and Assyrians. It has been claimed to be the forerunner of the book-plate. It was made three or four thousand years B. C. There has also been a

statement that book markers were used by the Japanese in the tenth century—but this is doubted by the most careful book-plate investigators.

How many of those present know the origin of the word book? Before paper came into use, our forefathers inscribed their letters on wood. The *boc* or *birch*, a close-grained, white wood, which was plentiful in Northern Europe, was used for this purpose; and, hence the word book. Books bring to our knowledge the history of the past, giving written information taken down "on the spot" concerning the experiences, as well as the observations, of those who have lived before us. This is much more accurate than the traditional word of mouth information, which may be falsified by the designing, or may be erroneously quoted by the aged, whose memories have become treacherous. Written history can be better studied, and the truth more certainly sifted and extracted than from word-of-mouth history, which is usually tradition. Some one has said: "The lie of to-day in three hundred years becomes tradition; and in six hundred, history." Good, pure historical accounts, carefully written on the spot by a good truthful observer and historian, are important to the world; and it is this alone that will stand the test of time, and constitutes good, honest literature.

A poet has beautifully expressed the thought as follows: The poem is entitled "Old Books."

A thresher prime is Father Time!
When harvest loads his train,
He beats the hollow husks aside
And hoards the golden grain.

A winnower is Father Time!
The chaff he blows away;
The sweetest seed he treasures up
For many a year and day.

Oh, very wise is Father Time—
His flail is tried and true;
I love the garnered pile of books
He's winnowed through and through.

Dr. Oliver Wendell Holmes has said: "Knowledge and timber should not be used until they are seasoned." (Fig 3.) In well selected libraries, we find the "seasoned timber," with the "sap-

wood" and "cullings" eliminated. The writings of Charaka and other Hindoo medical men, which have come to light quite recently and are being deciphered only to-day by our Sanscritists, show that the Hindoos were wonderfully advanced in medical knowledge—much more so than had been supposed in later times. We now, with our present knowledge see how the Greek physicians probably received much of their knowledge from Egypt; the Egyptians, from Arabia; and the Arabs, from these Hindoos. This process of culling or elimination of the less valuable works of the past leaves behind the best literature, which is generally known as "The Classics," that is, *the highest and the purest*.

Books may help to make the home, as the reader is apt to remain contentedly at home. Therefore, books may become factors in domestic happiness, by bringing the family together, keeping them out of mischief and indulgences. Don't be a book miser, who buys books simply to hoard them, nor like the man who buys books not to read but to furnish his home. Shakespeare says: "He that wants money, means, and content is without three good friends." He might have added good books to this list. Sir John Davis said: "A French writer (whom I love well) speaks of three kinds of companions, men, women, and books." Fuller says: "To divert at any time a troublesome fancy, run to thy books; they presently fix thee to them, and drive the other out of thy thoughts. They also receive thee with the same kindness."

Southey has a similar statement. He says: I no sooner set foot in a library, and fasten the door, but I shut out all vices of which idleness is the mother, and ignorance the nurse; and on the verge of eternity, among so many illustrious souls, I take my seat with so lofty a spirit, that I then pity the great who know nothing of such happiness.

In this life we toil; and what do we get out of it? A home, food, clothing; but two more features may be added, *books and friends* of our own selection. All the foregoing assist in making the true "home." If we begin early enough, we can enjoy our home; but if we put off our pleasant domestic leisure hours too long, we miss all these comforts; for to the physician who is in the "grind," busy all the time with practice until late in life, seeing nothing but sickness, privation, and suffering, his life is one of toil and dis-

comfort. He becomes ignorant of the outside world, and is merely a stranger in his own home; and all pleasurable companionship with his family is broken off.

The earliest *printed* book-plate that is certainly known belongs to the Fifteenth Century (about 1470).² This plate is in a book that has a German binding (probably Bavarian). Therefore, we may conclude that printed book-plates were of German origin. The Germans named them *Bibliothek Zeichen*, or library labels. The English called them book-plates, as do all English-speaking people; and this name is still used in England. The world over, they are called "*Ex Libris*." These *labels* came into use when printing multiplied the number of copies of books; in order that the owners could recognize their property. The book-plate is almost always used by the book-lover.

The first printing in civilized Europe was apparently done by the Germans from wooden blocks, in 1423; but the Chinese had known this art four hundred years before that date. At first soft wood was used for the block; later, 1785, hard wood (usually box-wood). Next came the use of copper-plates, upon which was etched the design; and a little further on, these etchings were cut deeper by the graver's tool. About 1820, steel-plates first came into use in printing. Since that time, many improvements have been made and have been used in printing book-plates. An expert collector after examining a plate can tell approximately the century, the country, and the variety of printing with almost unerring accuracy. The first considerable emission of book-plates was about 1574, and the oldest English plate dates back to the latter half of the Seventeenth Century (1640).

The plates of the earliest book-plates used in America were engraved in England (about 1703). In America, before the Revolution, the libraries were few in number and small, especially in the Northern part. In the South, they were more plentiful. The ravages of time and war have left few examples of these early plates, which were all probably engraved in England. These early American book-plates were all armorial in character; but after the Revolutionary War, this evidence of English fashion, savoring of the nobility, was tabooed. After the Revolution, the native en-

² Painted book-markers had been in use before that time.

graver adopted the non-Anglican plates; and they became popular and, consequently, more numerous. The American book-plates, aside from the armorial, were few and far between a quarter of a century ago, but now they are numerous and of much better quality artistically, being better also in conception.

In lieu of heraldic or armorial designs after the War of Independence, they had implements of trade, commerce, agriculture, war, army, and navy; also simple labels, scrolls, flourishes, or mantling with shells, brackets, pen and ink-stand, books, pictures, portraits, flowers, etc. Some had the name with *Ejus liber* added. One name label stated that the owner was deaf and dumb.

A book-plate may be quite small. I have one less than one inch square. Others are large enough to fill the inside cover of the largest book. Therefore, some found in the large volumes of the past are enormous.

These plates are for a three-fold purpose: *first*, to show plainly the ownership in easily deciphered characters; *second*, to prevent the disfigurement of a valuable book; and *third*, to guard the collector against the book borrower and thief. Educated persons are notorious for illegible chirography, especially when writing their signature. Who has not had difficulty in making out the signature at the end of a letter? A kindly letter-head printed at the top of the page has often been hailed with joy, for the "puzzle" has been solved. To write the name on the inside of the cover of a book or on the title page, or even on the fly-leaf, takes away from the value of an expensive book, even when well done. Of all my older medical friends in Philadelphia, I can recall but one who was what I should call a good writer. As a salve to the poor chirographer I may mention that Mr. E. A. Poe in the "*American Museum Magazine*," published in 1838, in a paper entitled "How to write a Blackboard Article," says "you may take it for granted that when manuscript can be read it is never worth reading." The paper used in books is often bibulous. In that case, the ink will run, making the writing unsightly and still more illegible, if such a thing is possible. On the other hand, the book-plate often makes the book containing it more valuable; for collectors often buy books to obtain the plates in them."

Most of us remember the markings in our school-books, indi-

cating the ownership by the mutilating hand of the boy. (Girls were more neatly inclined.) Often the name was written on the inside of the cover, on the title-page, or on the fly-leaf; and even the edges of the leaves were mutilated by the owner's name in large, black, daubed letters. Sometimes inside the book were found poetic legends like these:

"Steal not this book, my honest friend,
For fear the gallows be your end,"

illustrated by drawings as crude as the poetry, a man hanging on the gallows; or

"Steal not this book, for if you do,
I'll send my bull-dog after you,"

the drawing illustrating an impossible man, and hanging to his leg a caricature of a dog; or

"Steal not this book for fear of life,
For the owner carries a butcher-knife,"

the knife, a large one, being shown in the drawing.
Of many others may be mentioned:

"Who steals a book that isn't his'n,
Soon or late will go to prison."

The English schoolgirls used the following,—

"If I by chance lose this book,
And you by chance should find it,
Black is the raven, blacker is the rook,
But blackest is the girl who steals this book."

An old book contained the following,—

"Here do I put my name for to betraye
The thiefe y^e steals my booke away.
John Fisher, his book."

In Central Pennsylvania, a form was frequently used to indicate the ownership of books, thus: "I am the property of Mr. Blank. You must not take me away from him, or I shall get awfully homesick." Another striking and short announcement

was: "Missing from the library of Mr. Blank." Coming to more manly, civilized, and enlightened book-markings; we have much ingenuity displayed. We have poetry, proverbs, and quotations, most of which deal with the non-returning borrower. One is as follows:

"If thou art borrowed by a friend,
Right welcome shall he be
To read, to study, not to lend,
But to return to me.

"Not that imparted knowledge doth
Diminish learning's store;
But books, I find, when often lent,
Return to me no more.

"Read slowly; pause frequently;
Return duly with the corners
of the leaves
Not turned down."

A French book collector's plate has upon it this suggestive quotation from the parable of the Ten Virgins: "Go, rather, to them that sell, and buy for yourselves." One plate that I have has upon it, "Treat me kindly, for I have a soul; return me shortly, for I have a lover."

Dr. G. T. Palmer, of Springfield, Illinois, in an article in the *Chicago Clinic* entitled, "The Doctor and His Book-Plate," gives two pithy book-plate inscriptions, viz.: "There is more joy in Heaven over one book which is borrowed and returned than over ninety-and-nine which remain sedately on the book-shelf;" and another in the same vein: "Acquired by purchase for the library of Thomas Jones, at a cost of five shillings—a method of acquisition recommended to others." An old American book-plate has the following legend: "The wicked borrow and return not." Some person has tabulated for his book-plate the following "Don'ts" for books:

"Don't leave a book face downward.
Don't turn the leaves down; use a marker.
Don't turn the leaves with your thumb.
Don't forget to return a book you have borrowed.
Don't cut the edges with anything but a paper-knife.
Don't open a book hurriedly. Hold the leaves loosely, and they will give gently."

A German, in the Seventeenth Century, placed upon his book-plate the following (translation) :

"By him who bought me for his own,
I'm lent for reading leaf by leaf.
If honest, you'll return the loan;
If you retain me, you're a thief."

In selecting for a book-plate a design that is not heraldic, you should choose something more or less personal,—anything that appeals to the owner's taste or is a reflex of his fancy or work, such as his profession, studies, or interests, symbolic or otherwise. If the individual is at all enthusiastic, he will, in all probability, not be satisfied with his first personally designed plate. A second one will commonly follow, which may not be so characteristic; but it will be likely to be more artistic or classic, especially if a book-plate artist is allowed free scope. Then of course it will be less likely to show off the owner's character. Many persons have quotations on their plates; and the following seem to be appropriate for such a purpose, being pointed and classic:

"My library is dukedom large enough."—*Shakespeare*.

"Book-keeping taught in one lesson—don't lend them."—*Punch*.

"To be without books of your own is the abyss of penury."—*Ruskin*.

"Have thy study full of books, rather than thy purse full of money."—*Lilly*.

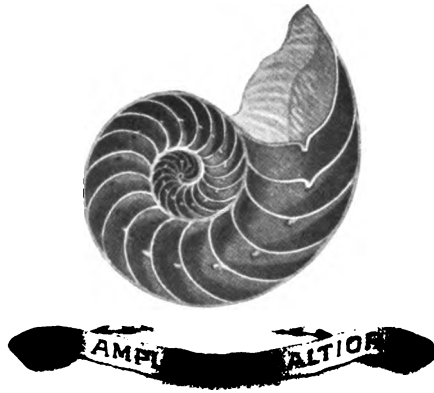
"If a book is worth reading, it is worth buying."—*Ruskin*.

"Books are for company."—*Writer of the Sixteenth Century*.

"A good library is the best university."

In my investigations of American book-plates, I have found some very interesting historical data on the subject, which, although not in a medical line, would, I feel quite sure, interest the reader. Hardy, in his book on "English Book-Plates," tells us that the oldest known plate of England bears the date 1640. Charles Dexter Allen, in his "American Book-Plates," states that the oldest known American plate is that of the Rev. John Williams, 1679. It was a simple name-label. He further states that the first dated American book-plate was that of Henry P. Dering, signed N. Hurd, 1749. The book-plate of William Penn, the proprietor and first provincial governor of Pennsylvania, was an old English armorial plate. It was celebrated on account of being the first book-

FIG. 3.



Oliver Wendell Holmes

Taken from his well-known poem "A Chambered Nautilus,"

FIG. 4.



Old English Armorial.

This plate, the first plate used in America, was made in England.

plate used in America; and also because of its great rarity, as well as of its owner's position in history. A genuine book-plate of William Penn was recently offered for sale at seventy-five dollars. It was engraved in England, before 1702 or 1703. A translation of the Latin motto is, "While I hold to glory, let me hold to right." Hardy, in his work on book-plates, says that it is "curious that William Penn does not impale the arms of Hannah Callowhill, to whom he was married in 1695." It was customary to do this at that time. (Fig. 4.)

The book-plate of George Washington was a Chippendale, or Rococo armorial plate, with the motto, "*Exitus Acta Probat*" (the end shows the deed). This plate, on account of its value, has been forged and placed in books, to make it appear that they had belonged to the library of General Washington, thus increasing their value and effecting their ready sale. Mr. Bushrod W. Adams, a banker in Philadelphia, was the owner of the original copper-plate of General Washington; and at the time of the "Great Central Sanitary Fair," in 1864, held in Logan Square, Philadelphia, Mr. Ward B. Haseltine, of Philadelphia, borrowed the plate of Mr. Adams and had a number of restrikes made, which were sold at the fair for the benefit of the wounded and sick United States soldiers. In order to enhance the value of the imprints, Mr. Adams had the plate cut in two and thrown from a bridge into the Schuylkill River. The sale of these impressions netted for the patriotic fund over one thousand dollars. Mr. Frank Haseltine, of Philadelphia, the son of Mr. Ward B. Haseltine, gave me much of the above information. No one has ever determined where this plate was cut or by whom, as it was not signed. It is generally supposed that it was cut in England. It has occurred to me that its general style closely resembles one of the plates cut by Paul Revere. When we take into consideration the fact that Revere was an ardent admirer of Washington, and that he was doing that kind of work just after the Revolution, we may deduce that he may have presented Washington with the plate as an evidence of his esteem. The only argument against this supposition is that armorial book-plates were not popular after the Revolution, especially in the Washington and Revere families. Although, as I have said, some think it was cut in England, a careful investiga-

tion of Washington's very precise accounts, which were complete and included other imported articles, fails to reveal any mention of such a purchase in England. (Fig. 5.)

The arms of Washington, showing stripes and stars, it is said, suggested the American flag. Miss Anne H. Wharton, the author of a *Life of Mary*, the mother of Washington, informs me that the arms, as depicted upon Washington's plate, are to be found upon the gable-end of the Washington house, called "Sulgrave Manor," in Northampton, England.* I have the information that at least twelve of the Presidents of the United States had book-plates; those that I have a knowledge of are George Washington, John Adams, John Quincy Adams, John Tyler, Martin Van Buren, and Theodore Roosevelt.

To show how much can be learned from a small illustrated piece of paper, which may range from one inch square up to the size of the largest volume, I shall give you the following striking illustration. A gentleman gave me the book-plate of Charles H. Wittlesey. I know nothing about him, except what I have learned from a study of the book-plate, which revealed to me the fact that he was a graduate of Yale College. This information I got from the college seal in the centre of the shield. Below this seal is a Phi Beta Kappa key, showing that he was an honor man; and the key rests on a scroll, indicating that he was a member of the "Scroll and Key" Society. In the background are two Chinamen, a pagoda, a name in Chinese, and a ship under full sail leaving the shore. From the foregoing I learn that he is in China, bearing a Chinese name, and is engaged in commercial pursuits. (Fig. 6.)

Outside of occupation, what we can learn from book-plates is quite wonderful. Their study assists us in keeping up our knowledge of dead and foreign languages, symbology, geography, history, mythology, literature, (by the short and brilliant literary

*In the spandrels of the old doorway at Sulgrave Manor House, Northamptonshire, England, the home of the ancestors of George Washington, and in the extreme point of the gable, are to be seen the stars and bars that appear in Washington's book-plate. When Washington Irving visited Sulgrave, prior to 1855, the Washington crest, with its raven or eagle wings, adorned the window of the buttery, and still earlier the entire family arms was emblazoned upon a window since removed to Fawsley Church.—Anne Hollingsworth Wharton.

FIG. 5.



A Chippendale book-plate of the first President of the United States.

FIG. 6.



Herman Charles Whittlesey

An American book-plate.

quotations), and the study of the printing art. The surroundings and peculiarities of a physician are liable to influence his mind; and, when untrammelled, his book-plate is likely to show whether or not he loves his profession. It may be symbolic, or something showing his specialty in medicine, or some subject that he is interested in as a doctor. Dr. J. W. Jones has a sphinx on his book-plate, indicating his interest in Egyptology. John Barneet Swett had a very interesting medical symbolic pictorial plate of remarkable design, which is thus described by Charles Dexter Allen in his book on American book-plates: "In the upper part, a corpse has been laid open for examination; and three Cupids are in attendance; a fourth reads a book of reference with woeful face, and a saw and vessel. Below the name, the Serpent of Æsculapius, turned about the rod, is placed between retorts and herbs (medicinal) growing in flower-pots."

To show how elaborate and varied some of the designs are, I shall cite a few examples: Diogenes, sitting on the ground, interestedly reading a book; his lamp on the ground, overturned. In his intense interest in the book he has forgotten his "quest for an honest man."

Another one represents Eve, less clad than Lady Godiva, standing before Adam, who seems oblivious of her presence; for he is looking at an apple with a magnifying glass, probably hunting for germs.

Still another represents two Cupids, who, in a jolly mood, are making an autopsy upon a dead lover.

One doctor has a skeleton of a man standing beside a tombstone and resting his elbow on the top of the stone, which is upon a grave. I should not call it a first-class advertisement for a doctor. One doctor wrote me that he had personally designed forty-two distinct varieties of book-plates. That was some years ago.

As we are interested in the study of doctors' book-plates, let us inquire why the medical man desires a book-plate? When the doctor is young, strong, and energetic, he is vigorous and enjoys sound health. He is then interested in outside activity, for his recreation enjoying such amusements as hunting, walking, baseball, football, tennis, automobiling, or rowing; next, he will per-

haps take up billiards, pool, croquet, or golf. Later, as he grows less active and tires of early pleasures of his former life he takes up cards; and finally he will, long after middle life, take up a restful occupation for body and mind. He begins to care for a quiet corner with his books. They do not stir up argumentation, nor cause any dispute that is likely to disturb his mental quietude. Some one has said: "For in the library or in the world, a reader makes many acquaintances, but few friends; and these will be of his own choosing." So he will build up a library of his own selection that soon becomes an object of pride. The next thing is to get a book-plate, usually a simple book-label, containing his name surrounded perhaps with a wreath or a line border; the latter being called an ornamental label. Later on, he becomes interested in artistic book-plates and has one of some pretensions made; more complex and more artistic than the first one. His library at this time is probably made up, not only of medical books, but also of a goodly supply of volumes that interest him, archæological, ethnological, philosophical, scientific, or literary works. These studies afford a relief to the worn-out brain of the doctor, a needed rest from the stress of practice.

A wise man has said, "There are times with every individual when nothing will satisfy the yearnings of the heart and mind like reading. Then let it be both instructive and of good import."

The man who loves book-plates must first love his library and be proud of it; and then he proceeds to adorn it with a neat marker. The study of the kinds of book-plates is interesting to the student. Lord de Tably has given the following tabulation of the dates of these plates:

Early armorial (1500-1700).

Jacobean (1700-1740).

Chippendale, or Rococo (1740-1775).

Wreath, Ribbon or Festoon (1775-1800).

Modern Armorial (1800-1905).

These are the prevailing styles of those approximate dates. The early armorial was generally embellished with much mantling. The Jacobean style had no helmet or mantling. There was a frame around the escutcheon, in place of the mantling. The shield was

the distinctive work, often put on a bracket or sideboard, on which was placed the owner's name.

The Chippendale followed the Jacobean, and was designated by the fact that the two sides of the shield were unlike in outline, or unsymmetrical, with a frilled or shell-like border, and with decorative flourishes and flowers.

A historical plate is one that may commemorate some noted or interesting event or exploit in the family. The Symbolic Plate is one that gives some symbolical information of the owner's profession, his fancies, or his business, classic or otherwise. However, modern plates are quite often symbolical.

The Rebus Book-plate is called, also, Canting, Joking or Punning, usually imitating armorial. The French people use this style more frequently than do any other nationality. These mimic armorial plates usually play upon the owner's name. I have one that belonged to a Dr. Wheat, who has a number of heads of wheat. Dr. Koenig's has a king arrayed in ermine. Mr. Jack is represented by a jack playing-card. Dr. Lion has a conspicuous lion. Dr. Brandstetter (meaning incendiary) has an incendiary in full flight, with a burning brand in his hand; a house in the distance is burning. Mr. Schiffer has a ship, and Dr. Dove, of Richmond, Va., has a dove with an olive branch in its bill. Mr. Seaman has a dolphin and an anchor. Mr. Peiper has Pan playing on a pipe. Mr. Greenwald shows a green forest. Mr. Turnbull has a bull by the horns and is turning his head, to save the life of his king. (This name originated in the past from such an exploit.) Mr. William Spooner has two doves billing and cooing (spooning) and two overlapping hearts. Hardy tells us that a very old German plate of a member of a Nuremburg family named Holzschuher (wooden shoes or sabots) shows on a shield a wooden shoe, which is supported by two angels.

The Canting, or Rebus, being novel, brings a new interest into the study of book-plates. It simulates the "puzzle department" of the newspaper, it adds a variety to the subject and keeps the collector on the alert for amusing surprises from the hidden wit. (See Fig. 1 for an example of this character.)

The following are some of the terms to designate the different kinds of book-plates: Seal, Landscape, Library, Book-pile, Emblem-

atic, or symbolic, allegorical, monogram, initial, biographical, canting, medical, masonic and many others. The modern book-plates are often made with elaborate mantling and other attractive and artistic ornate embellishments. The early plates were usually more simple with the owner's name on a writing card or a simple name-card, with or without a border or wreath, either printed or engraved.

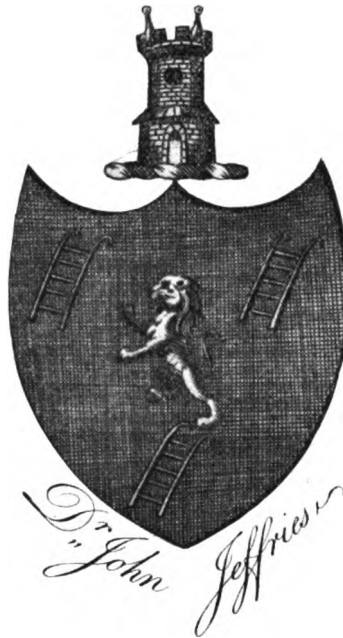
It has been my endeavor to determine the oldest known physicians' plates and in my investigations I have looked over much literature. In the "Study of Book-plates," by Mr. J. B. Leicester Warren (Lord de Tably), published in 1900, he gives a list of dated plates anterior of 1700. He gives the dates of two, 1681 and 1690. The plates are lettered with the following inscriptions: "John Lawrence Loelius, Doctor of Medicine," and "Johannes Laurentius Leolius, Philosophæ et Medicinæ Doct." They were probably owned by the same person.

I will give you a brief sketch of some of the oldest known American medical *ex libris* that we have a knowledge of at the present time. It would seem that very few American doctors had book-plates in early times, so that the few we have heard of are doubly interesting.

Allen also tells us that the earliest physicians that had book-plates were Jeffries, Assheton, Bond, Beatty, Holyoke, and Middleton. Dr. Allen Hyde, of Connecticut (1774-1850) is noted in Allen's book as being the owner of an *ex libris*. Drs. John Morgan and Benjamin Rush were both eminent professors, members of the faculty of the University of Pennsylvania Medical Department. The plates of both are Armorial Chippendales.

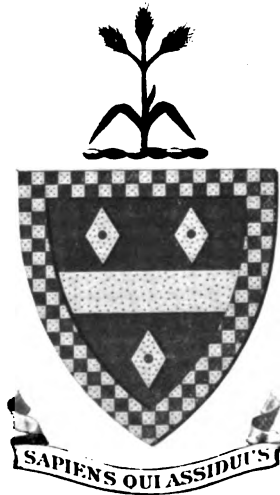
Dr. John Jeffries, who lived from 1745 to 1809, had a plate, a sample of which I have in my collection. It is ornamented with a plain armorial shield and a crest. It is supposed to have been the work of Callender. History tells us that Dr. Jeffries delivered the first course of medical lectures ever given in New England, in 1789. The course was upon human anatomy. He practised in Boston, and was an out-and-out royalist. He had an additional reputation as a balloonist; also as a scientific investigator. It is said that he was the surgeon who recognized the dead body of General Warren after the Battle of Bunker Hill. (Fig. 7.)

FIG. 7.



He delivered the first course of medical lectures
ever given in New England (1789).

FIG. 8.



Weir Mitchell.

Philadelphia's noted poet, writer, and physician.

Dr. Thomas Bond was the owner of a plate. He was born in 1732, in Maryland. He was a professor in the early days of the Medical Department of the University of Pennsylvania. He was a resident of Philadelphia until his death in 1769. He had the honor to have delivered, in December, 1766, the first course of clinical lectures in the United States at the Pennsylvania Hospital.

Dr. Edward Augustine Holyoke was a Boston physician, and was born about 1730 and lived to be one hundred years old. His plate was the work of N. Hurd, who was a noted book-plate designer. It was said by Allen, in his "American Book-Plates," published in 1905, that this plate was then over one hundred years old. It is a Chippendale, with a festoon of a cloth at the bottom of the frame; a shell, at the base of the escutcheon, with rose sprays.

Dr. Peter Middleton's plate was also an Armorial Chippendale. He was a native of Scotland, and was credited with having made the first recorded dissection in America.

The book-plate of Oliver Wendell Holmes (1809-1894) is a pictorial one on a nautilus shell, with the motto, "Per ampliora ad altiora." (Fig. 3.) "If you look into the Roget's Bridgewater Treatise," said the autocrat one morning, "you will find a figure of one of these shells and a section of it. The last will show you the series of enlarging compartments successively dwelt in by the animal that inhabits the shell, which is built on a widening spiral. The enlarging animal builds a new and larger compartment each year, and moves into it." Dr. Holmes was asked which of his poems he liked the best, and the replied: "The Chambered Nautilus." The poem beautifully describes the significance of the design.

"Build thee more stately mansions, O my soul,
As the swift seasons roll!
Leave thy low-vaulted past!
Let each new temple, nobler than the last,
Shut thee from heaven with a dome more vast,
Till thou at length art free,
Leaving thine outgrown shell by life's unresting sea!"

Eleven, if not more, of the members of the medical fraternity Alpha Mu Pi Omega I know to have book-plates. Dr. S. Weir Mitchell's plate is armorial. (Fig. 8.) Dr. Fenton, of the Philadelphia Chapter, has an initial book-plate with a spray; Dr. E. W. Holmes (now dead), of Philadelphia Chapter, a pictorial plate;

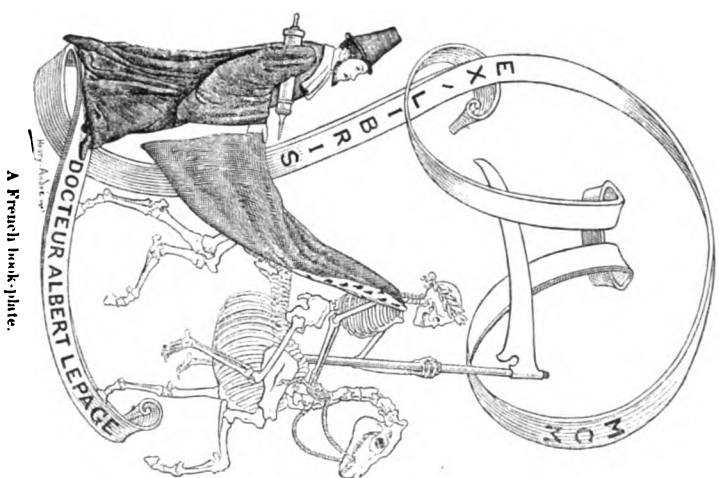
Dr. Edward Randall, of Galveston, Texas Chapter, a plain armorial; Dr. Walbridge, of the Milwaukee Chapter, a pictorial plate; Dr. De Forest Willard, of the Philadelphia Chapter, an armorial plate; Dr. Clifford W. Farr, of the Philadelphia Chapter, has a pictorial plate, and Dr. Charles F. Gardiner, of Colorado, has a heraldic plate.

A physician, Samuel W. French, of Milwaukee, has two very elaborate book-plates. The older one has a Greek border, a Roman interior, and a Hebrew altar. These stand for the sources of classic literature. The Pantheon is illustrative of ancient ideas. The opening in the top was for Jupiter Pluvius. There is also a quotation from Victor Hugo; and, lastly, a motto (signed in autograph by Dr. French) stating: "My books shall be heirlooms to unborn generations." The newer plate represents the doctor sitting in front of his fireplace. A book has fallen from his hand. He is smoking, and the cloud that rises represents Phoebus, the sun. Aurora personifies the light of literature; Mercury, the messenger of the gods, etc. The whole is the "book-lover's dream"—the seal of Harvard College. Drama is represented by a bust of Shakespeare; Art, by a palette; Music, by a violin; Medicine, by a statue of Æsculapius; the thirty-second degree Masonic motto, Knights Templar arms; French coat-of-arms at lower right hand; light shown by sun, Bible, and literature. Motto: "I give light to all nations throughout all ages." I wish to give to Dr. French the credit of giving me a start in the *ex libris* "hobby," and I heartily thank him for the pleasure that he has afforded me. Without this early helping hand, this paper never would have been written.

I probably have more doctors' book-plates in my collection, but the distinguishing evidence is not present, as in the past titles have usually been omitted. Hence, the difficulty in tracing the occupations of the owners of the older plates only are likely to be recognized. For instance, in England, surgeons have refused to be called doctors, and in the past, owing to their antipathy to the title doctor, would not take the degree of Doctor of Medicine, as they said it savored of the apothecary shop.

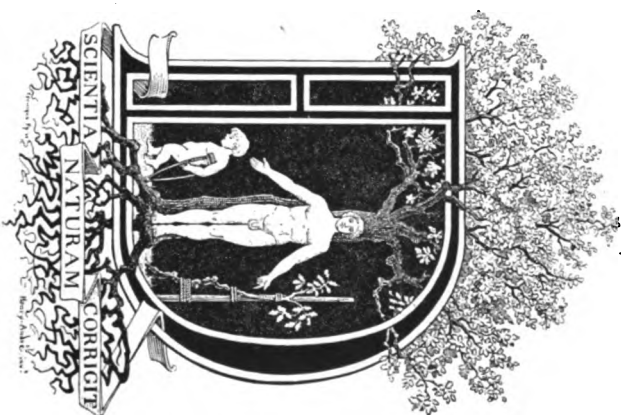
My collection is not so very extensive, but it is large enough to give you an idea of the general trend of the doctors' suggestive ideas in this line of art. The greater number of the plates

FIG. 9.



A. French book-plate.

FIG. 10.



Ex Libris du Dr. Henri Dudaux
French orthopaedic surgeon.

FIG. 11.



A French plate.

FIG. 12.



Plate of a Röntgen-ray physician in Paris, France.

FIG. 13.



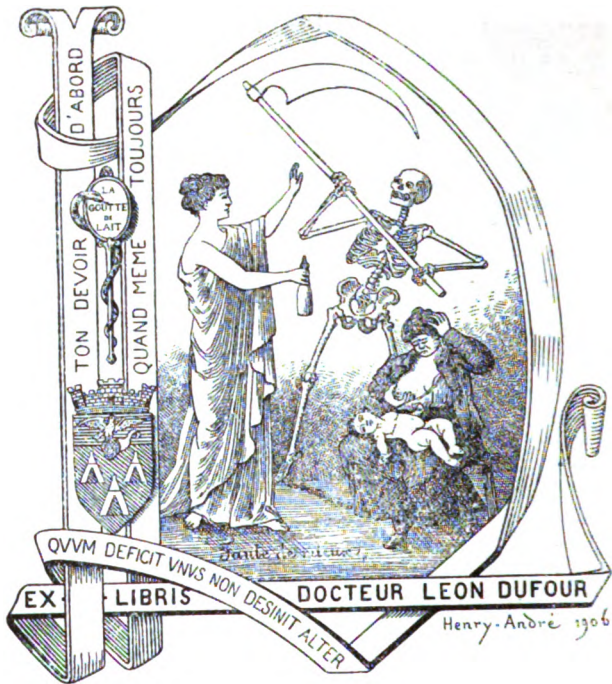
A German plate.

FIG. 14.



An American book-plate.

FIG. 11.



A French plate.

FIG. 12.

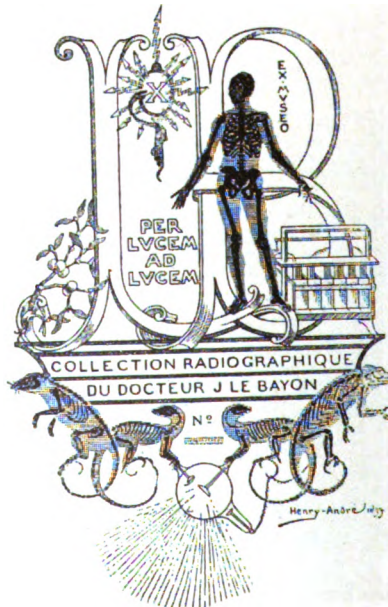


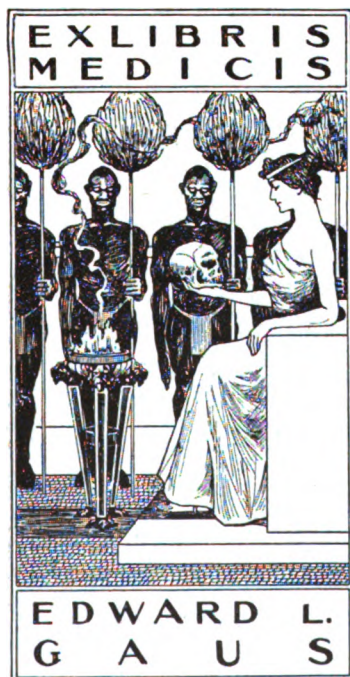
Plate of a Röntgen-ray physician in Paris, France.

FIG. 13.



A German plate.

FIG. 14.



An American book-plate.

FIG. 15.



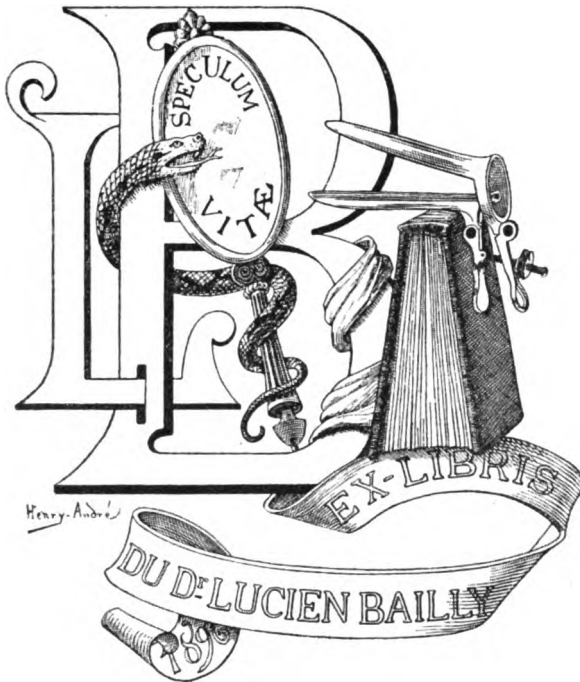
A German book-plate.

FIG. 16.



Plate of a physician of Jena, Germany.

FIG. 17.



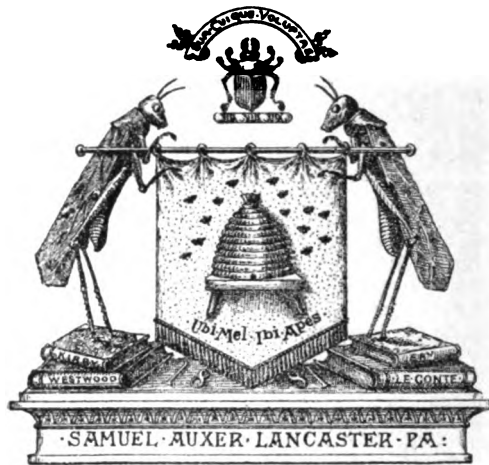
The ex libris of a French gynecologist.

FIG. 18.



Plain, armorial book-plate of Daniel Webster.

FIG. 19.



Nº

Plate of an entomologist, imitation armorial.

FIG. 20.

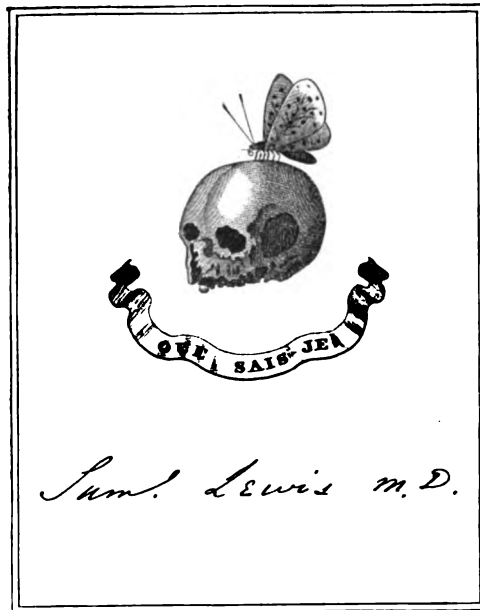


Plate of a noted Philadelphia physician.

FIG. 21.



Plate of a prominent Boston physician.

FIG. 22.

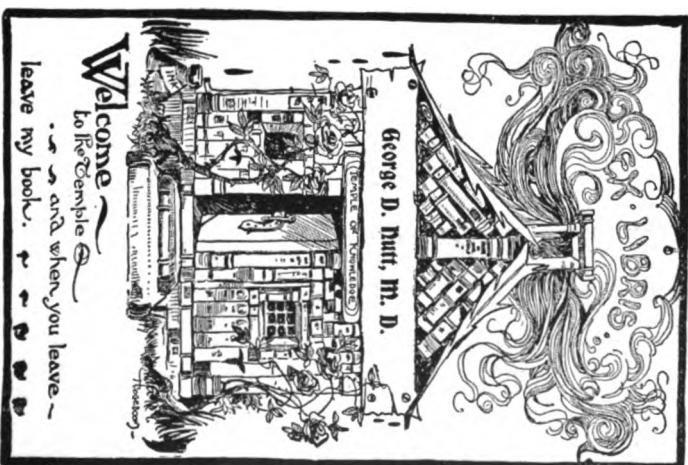
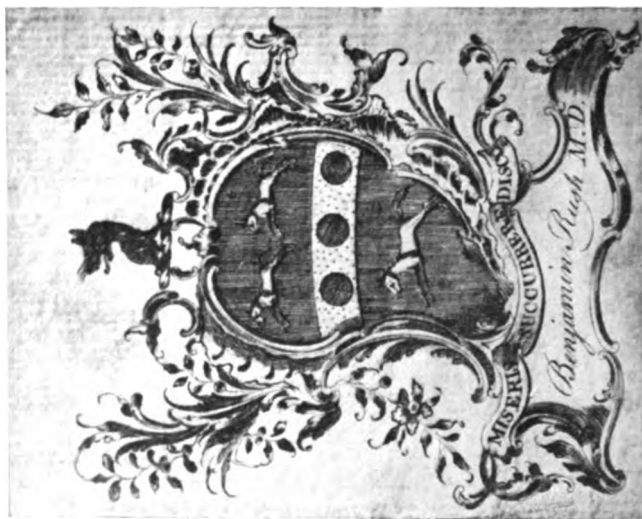


Plate of a Williamsport, Pa., physician, a house made of books, with rafters of quill pens.

FIG. 24.



A photographable reproduction of one of the very few remaining plates of Dr. Benjamin Rush, "A Signer," of Philadelphia. It is said Dr. Rush destroyed them for some unknown reason. A Chippendale plate.

FIG. 23.



The plate of a New York neurologist.

are modern armorial. Then come skulls, skeletons, vials and bottles, bowls, chemical bulbs, beakers, retorts, and other chemical, mechanical and electrical apparatus, surgical instruments, as saws, specula, microscopes, etc., medical and surgical books, a bust or statue of Æsculapius himself, with or without his staff and snake; Hygieia, with her lamp, bowl and serpent; Mercury's wand, or the caduceus (the two snakes around a staff); Death as a reaper, with his scythe; an office lighted with a student's lamp; laboratory interior, X-ray apparatus, etc. (Figs. 9-12.)

The American doctors, on their plates, do not take to scantily clothed figures. This occurs more frequently among the French, while the German physicians, more especially those of a couple of centuries ago, also seem quite fond of this form of illustration on their *ex libris*. The examples that I shall give you will show you how these different emblems, instruments, etc., are manipulated to give variety to the subject, the study of which is interesting, as many are quite ingenious. (Figs. 13-24.)

On examination of the physicians' book-plates in my possession I find that the following countries are represented: In 206 *ex libris* of physicians, there are 117 Americans, 30 are German, 17 are English, 12 are French, 6 are from Austria-Hungary, 6 are Swiss, 2 are Italian, and one each is Danish, Spanish and Canadian. Thirteen are of unknown nationality.

In taking an inventory of my medical book-plates, I find the following subjects pictured (this showing indicates the medical peculiarities of the collection that I have):

TABULATION OF THE VARIOUS STYLES EXHIBITED IN THESE PLATES

Armoial, or Heraldric, 48 (Figs. 17 and 18); Chippendale, 2; monogram, 1; wreath, 2; wreath and crest, 2; wreath and ribbon, 1; allegorical, 1; classical and architectural, 3; crest, 1; pictorial (not medical), 29; mask (the stage), 1; library view, 3; female, dressed, 5; female, nude, 8; nude female and skeleton, 2; art and art implements 1; old man reading a book, 1; bee hive, 1; flowers, 1; entomologist, 1; landscape, 1; portrait, 3; Sphinx, 1; Nautilus, 1; caricature of a dog, 1; fight, 1; punning, 4; fancy initials, 1; book labels, with or without border or wreath, 15; skulls, 11; skull and pictorial, 1; Æsculapius, 4; pictorial medical, 4; skele-

ton, 6; skeleton and book pile, 2; serpents, 5; serpent and staff, 1; serpent and bowl, 6; serpent and owl, 2; caduceus, 1; armorial and telephone, 1; chemical apparatus, including scales, 4; microscope, 2; old doctor, reading in his phaeton, 1; doctor's office (interior view), 2; doctor and patient, 1; obstetrical, 1; new-born babe, 1; surgical volume, 1; surgical knife, 1; lancet, 2; total, 202. (Figs. 19-23.)

In the foregoing table, you will observe that more than one-fourth are armorial, and one-third are strictly medical plates, having pictorial subjects indicating that the owner was a medical man. Fourteen had serpents; twelve, skulls; nine, skeletons; and ten, nude females. Of twelve French plates, four were of this character, and of thirty German *ex libris*, four were found. The Sphinx was in the plate of Dr. G. W. Jones, who is an earnest student of Egyptology, and the Nautilus was displayed upon the marker of Dr. Oliver Wendell Holmes.

When we study these plates, we find a greater variety of design than is indicated in the foregoing tabulation; for some have many more ideas than are shown in the table. There are fully a dozen ideas sometimes embodied in one plate. We also find much ingenuity displayed on the part of the owner or his designer, and this is what gives spice to the study of these book-markers. Otherwise, the subject would be very commonplace. When we go outside of the armorial plate, we have much variety in the conception. All this is barely shown in the tabulation; for we have often so much diversity in the illustrations that a single line in the table would not describe it. Take, for instance, Dr. Samuel W. French's *ex libris*; several different coats-of-arms are displayed, along with other embellishments, which indicate allegory, art, music, masonry and medicine.

I have gathered the physicians' plates from Charles Dexter Allen's work on American book-plates, in which he gives a list of early American *ex libris*—an alphabetical list of plates so far as known, in 1894, simple name-labels having been omitted. The name, given in the text, is a copy of that on the book-plate.

"Dr. Alexander Anderson's" plate is an admirable Chippendale. He was the first engraver on wood in America. (Non-medical.)

"Ralph Assheton, M.D., of Philadelphia," had an armorial

Chippendale. He studied medicine in Edinburgh. He was a son of the councillor. (Non-medical.)

"J. Beatty, M.D.," had an armorial pictorial. He rose to the rank of colonel in the Revolutionary War, and was a delegate to Congress, 1783-1785, a member of the Federal Constitution, and a member of Congress. Among other objects pictured is a caduceus. He was born in Pennsylvania and died in New Jersey in 1826.

"Dr. H. Boyerton, South Carolina," had a motto: "Dinna forget the book belongs, etc." (Not in Allen's list.)

"Thomas Bond, Surgeon" (1712-1784), had an armorial Chippendale book-plate. He was a distinguished physician and surgeon of Philadelphia, born in Maryland. (Non-medical.)

"Dr. George Cabell, of Richmond, Virga." Allegorical. A flaming heart resting on an anchor is the only medical subject shown, if such it is. Motto, "*Spes mea in Deo.*"

"John Clark, M.D." Plain armorial. (Non-medical.)

"C. L. Cleborne, M.D." Armorial. (Non-medical.)

"Chris. C. Cox, A.M., M.D., LL.D." Armorial. Crest only. (Non-medical.)

"Christopher C. Cox, A.M., M.D." Name-label with skull and crossed bones.

"Charles Chancey, M.D." Plain armorial. Motto, "*Sublimis per ardua tendo.*" (Non-medical.)

"Dr. J. Dove, Richmond, Va." Armorial canting—a dove holding an olive branch in his bill. (Non-medical.) Motto, "*Deus providebit.*"

"John A. Graham, M.D." Armorial, wreath and ribbon. (Non-medical.) Probably one of Washington's physicians. Motto, "*Ne oublie.*"

"Peter Hay, M.D." Armorial Chippendale. (Non-medical.)

"Edward Augustine Holyoke." Armorial Chippendale, probably by Hurd. Eminent physician and surgeon in Massachusetts. He performed an operation at the age of ninety-two. (Non-medical.)

"Dr. John Jeffries." (Fig. 7.) Plain armorial, probably by Callender. His history will be given in another place in this paper. (Non-medical.)

"Kenneth McKenzie." Armorial. A Virginia physician. (Non-medical.)

"William McKenzie, Surgeon." Armorial Chippendale. Dated 1766. (Non-medical.)

"Henry McMurtrie." Pictorial landscape. Physician of Philadelphia. (Non-medical.)

"Henry McMurtrie." Literary pictorial. Motto, "*Respice finem.*" (Regard the end.) A Cupid weeps beside a mortuary urn, whose top is a flame. The serpent of Æsculapius carries the motto-ribbon. Dr. McMurtrie was also a Philadelphia physician.

"Albert G. Mackey, M.D." Plain armorial. Physician and author. Charleston, S. C. (Non-medical.)

"Peter Middleton, M.D.," South Carolina. Armorial Chippendale. Born in Scotland. He made the first recorded dissection in America.

"John Morgan, M.D., Philadelphia." Armorial Chippendale. A graduate of Edinburgh, a founder of the Medical Department of the University of Pennsylvania, and having the honor of being its first professor, and consequently being the first medical professor in the United States, having been appointed May 3, 1765; professor of the Practice of Physics, and a founder of the American Philosophical Society, 1769. (Non-medical.)

"Oliver Pease, Owner." Pictorial. Motto, "*Read and return.*" A physician of Suffield, Conn. Date about 1800. Pen-drawing. (Non-medical.)

"Thomas G. Prioleau." Armorial. Ribbon and wreath. Physician of Charleston, S. C. (Non-medical.)

"B. J. Raphael, M.D." Pictorial. Skull and cross-bones. A physician of Kentucky.

"B. J. Raphael, M.D." Pictorial. A hand holding a surgeon's knife. Louisville, Ky.

"G. C. M. Roberts, M.D., Baltimore." Literary pictorial. Books and candle. (Non-medical.)

"George C. M. Roberts, Baltimore, M.D." Similar to the foregoing, but no motto. (Non-medical.)

"Rush." (Fig. 24.) Rush arms; armorial, the plate of Benjamin Rush, the signer, a very rare plate, as he destroyed all the plates he could find. Dr. William Pepper, of Philadelphia, has

one; and so has Dr. E. S. Potter, from whom I secured a photograph. (Non-medical.)

"John A. Smith." A beautiful pictorial plate. President of William and Mary College, 1814-1826. Doctor of medicine in Virginia. (Non-medical.)

"Samuel Stringer." Armorial Chippendale. Born in Maryland. Prominent physician in Eastern New York State. (Non-medical.)

"J. B. Swett." A symbolic plate, essentially medical. Allen's description of it is found in another part of the paper. Dr. Swett lived in Newburyport, Mass.

"John C. Warren." Armorial pictorial. A shield above; the serpent and rod of Æsculapius lie on the ground. Eminent surgeon and medical writer of Boston.

In the list of Charles Dexter Allen, in which he gives all the known engraved plates of early Americans up to 1894 (the list numbers 995), we find thirty-one book-plates of early American physicians. Of this number, only eight are medical in character. In the list of Allen's, I find the plates of three medical libraries: New York College of Pharmacy, the Boyleston Medical Library of Massachusetts, and the Massachusetts Medical Society (incorporated 1781). (The plate is signed Callender.)

Of the plates of physicians from Mr. Allen's "Early American Book-Plates," I find the following: Armorial Chippendale, 9; armorial, plain, 5; armorial, decorated, 2; armorial, pictorial, 2; armorial crest, 1; armorial canting, 1; armorial wreath and ribbon, 2; pictorial, 4; pictorial literary, 3; pictorial landscape, 1; allegorical, 1; symbolic, 1; crossed bones, 1.

You will observe that almost all are armorial or pictorial, with variations. The pictorial plates are those in which the medical subjects are found. In the list there may have been more plates of physicians; but if so, the distinctive indications were absent. In olden times it was not customary to put titles on plates; even to-day we frequently notice their absence.

BOOK-PLATE COLLECTING

The collection of book-plates is a fad of quite recent origin. To-day these collections number thousands. The largest private

collection is that of the late Herr Graf zu Leinigen Westerbury, who died a few months ago. His collection embraces over twenty thousand specimens. A good authority estimates that there are over one hundred thousand plates in existence. In almost all civilized countries they have national *ex libris* societies with an enormous membership. Such organizations are found in Germany, France, England, Switzerland, and other countries, including the United States, which latter society is in a somnolent state, or we might say it exists in name only.

The best way to start a collection is to have a book-plate of your own, either artistic or clever; and then secure the addresses of owners of book-plates, sending out requests for an exchange. Some non-owners secure a few duplicates, and in the same way secure specimens. You will find the owner, as a rule, quite willing to accommodate you; but now and then you will get a rebuff by having the plate sent back to you with the announcement that they do not exchange. Others will state that they only desire certain plates, the works of a particular engraver, or perhaps only steel engravings will be exchanged. Usually there is much pleasure in corresponding with owners.

In regard to the best way to keep a collection, I may give you my experience. At first, I used a book that was made for the purpose, with an index in front of it. In this book I pasted the book-plates firmly down; afterward I pasted them by only the corners, as they did not wrinkle so much, and still later I fastened them at the corners with a triangular piece of paper, gummed on both sides. This was still unsatisfactory, as the leaves in the large book curled, when opened, and many plates became loose at that point. Furthermore, it was not easy to change the plates or to re-arrange them in different order.

I then secured a thick, soft, pale-blue paper card, $7\frac{1}{2} \times 9\frac{1}{2}$ inches, upon which I fastened the upper edge of the plate with two hinges made of muslin, which was gummed on one side. This muslin was folded with the gum on the outside and moistened, one side sticking to the back of the plate, and the other side becoming adherent to the card. This arrangement enabled me to inspect the back of the plate, where the name of the engraver and other data are usually placed. By this card system, I am also enabled to

assemble the plates as I please; as, by country, occupation, style, design, etc. When I want to show a card to a person at a distance, I can do so without endangering a large portion of my collection, as would be the case were they placed in a book. Another advantage is that data can be written on the card, or an interesting letter can be pasted on the back. This makes the information more accessible than if placed in an index.

Book-plates are often bought and sold.

The value of a book-plate may depend upon the age, or rarity, the popularity or eminence of its owner, the reputation of the designer or engraver, the artistic skill shown, and finally upon the ingenuity, novelty, or oddity of the design.

A Medical Home-Coming Week

A SERIES OF CLINICAL LECTURES AND SPECIAL
DEMONSTRATIONS DELIVERED AT THE UNIVER-
SITY OF PENNSYLVANIA FROM MARCH 28 TO
APRIL 1, 1910

Edited by JOHN G. CLARK, M.D.

Professor of Gynæcology in the University of Pennsylvania; Chairman of the
Committee of Arrangements for the Second Annual
Home-coming Week

THERE is probably no department of learning in which the fund of wisdom accumulated by the individual at the time of graduation does not need to be supplemented by the knowledge gleaned from further study and observation during the years that follow. In the present age this is especially true of the fields in which either the sciences or the useful arts are of preponderating influence, and nowhere, perhaps, is this more obvious than in the domain of Medicine.

It was in the realization of this need that the University of Pennsylvania first gave a series of exercises and demonstrations for the benefit of its home-coming graduates, and it is with the added realization of the appreciation shown by its former students at that time that it has arranged in the present year another series of exercises for a Home-coming Week.

The lectures and demonstrations, operations and clinics, as well as certain social events, were arranged to occupy five days of the week following Easter, from Monday morning to Friday night, March 28 to April 1, 1910, inclusive. The first day began with a symposium of lectures on serum diagnosis and serum therapy, followed in the afternoon by clinics and demonstrations in the hospital and dispensary. On Tuesday morning the speakers of the day considered the physiology, pathology, and treatment of the cardiovascular system, the afternoon being again devoted largely

to clinics and dispensary work. On Wednesday and Thursday surgical clinics and surgical lectures were of chief importance, and on Friday gynaecological and obstetrical subjects were more particularly considered.

The exercises were begun with a lecture by Dr. Alfred Stengel on the principles of diagnosis and treatment by means of sera. This was followed by a demonstration and discussion of agglutination tests by Dr. T. A. Cope and Dr. F. H. Klaer.

Dr. John T. Laird gave a lecture on the Wassermann reaction and the modification of it by Noguchi,¹ including a brief discussion of their theory and practice, significance, fallacies, etc., and showing the reagents and reactions, and the methods of performing the tests. The latter were taken up in more detail in a later demonstration of the technic at the Philadelphia General Hospital. After this, Dr. D. J. McCarthy discussed Much's reaction, the cobra-venom hæmolysis test in the diagnosis of certain nervous diseases.

Dr. B. A. Thomas² gave a talk on opsonins, the opsonic index, bacterins, and bacterin therapy, and Dr. A. P. Francine³ closed the morning session with a paper on Tuberculin in Diagnosis and Treatment. He emphasized the fact that specificity holds good of small doses only, the greater reliability of the reaction in children than in adults, and the secondary value of the reaction as evidence, when compared with the clinical symptoms. He showed several cases of each reaction: Calmette's in the conjunctiva, Pirquet's on the flexor surface of the forearm, Moro's on the epigastrium. The importance of *slight* abrasion, avoiding scarification, for Pirquet's test was pointed out, and the accompanying induration commonly seen was demonstrated. The uncertainty of the reaction and the variability of the active agent—never yet isolated in pure condition—were dwelt upon. In therapeutic use the rule was laid down that the important point is not the variety, kind, or make, of tuberculin used, but the method of giving it—very small doses

¹ See INTERNATIONAL CLINICS, vol. i, Twentieth Series, for descriptions of these tests, discussions of their value, technic of performance, and reports of results obtained.

² This paper is promised for the September issue of the INTERNATIONAL CLINICS.

³ This subject has also been treated in the preceding issue of INTERNATIONAL CLINICS.

increased very slowly. It is unsatisfactory from the fact that to give enough at any time to produce a reaction is very inadvisable, and without a reaction one is always working in the dark; it is on the whole doubtful whether it is to be preferred to a simple dietetic and hygienic treatment.

In the afternoon Dr. R. G. Torrey showed a number of dispensary patients having various chronic affections of the lungs and pleuræ. Among them were a patient with a one-sided pleurisy and consequent unilateral contraction of the chest, and an interesting case of old fibroid change in which the fibrosis had entangled the sympathetic nerve and in this way brought about a permanent inequality of the pupils, the one on the affected side being slightly larger than the one on the other side.

In the eye department Dr. G. E. de Schweinitz and his assistants held an interesting clinic in which a large number of cases were shown. A number of new ophthalmological instruments and their use were demonstrated, among them being Schiötz's *tonometer* (Fig. 1), in which one of a series of small weights is supported by the resistance of the eye-ball and produces a deviation of a pointer on a scale which is so calibrated that the interocular pressure can be read in millimetres of mercury. The instrument shown in Fig. 2 is Hertel's *exophthalmometer*, a frame supporting two sets of angularly placed mirrors so arranged as to fit accurately against the outer edges of the orbits. When placed in this position the image of a scale of millimetres is superposed on the image of the eye viewed laterally, and the degree of protrusion can be read off.

In the Nose and Throat Dispensary Dr. Grayson gave a talk on the correction of nasal deformities, and a number of operations and methods of treatment were shown to all who were interested in the subject, the demonstrations being continued on Tuesday, Wednesday, and Friday, and including an interesting case of Dr. Stout's, a man who apparently had three sets of vocal cords (Figs. 3 and 4).

THE CORRECTION OF DEFORMITIES OF THE NASAL SEPTUM

DR. CHARLES PREVOST GRAYSON.—The deformities of the nasal septum, either congenital or acquired, are of such infinite variety and degree that it seems to me that the best use to which we can put

FIG. 1.



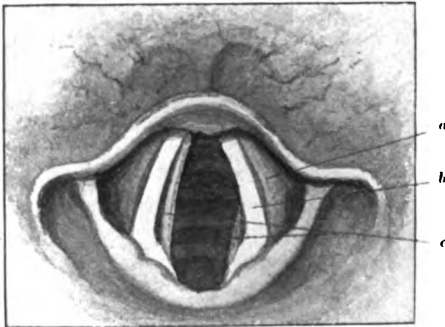
Method of application of Schiötz's tonometer.

FIG. 2.



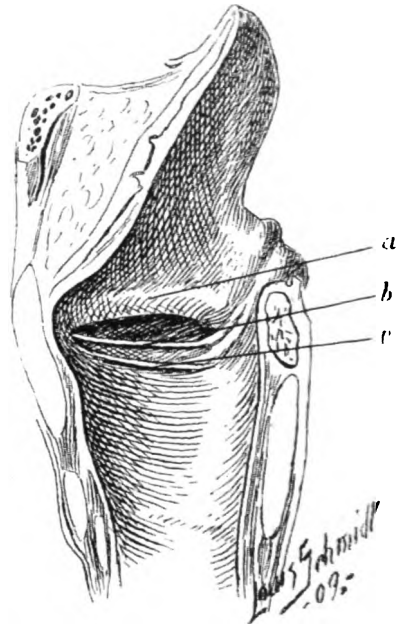
Hertel's exophthalmometer in use.

FIG. 3.



Patient showing three pairs of vocal cords. The condition was found in a young man, with chronic pharyngitis and laryngitis and a "cracked voice," who had had trouble with his throat for several years. *a*. False cord. *b*. True cord. *c*. Supernumerary cord.

FIG. 4.



Diagrammatic, sagittal view of same patient.

the time and material at our disposal this afternoon will be in a general study not so much of operative technic as of the choice of operation for the particular type of deformity encountered. The departures from the normal structure are so numerous and they so commonly merge into one another that it would be manifestly absurd to attempt any formal classification of them. The only distinction that is worth while is as to whether they involve wholly or principally the cartilaginous or the bony septum. The differences of operative procedure involved in this distinction involve the employment of general or local anæsthesia, the recumbent or sitting posture for the patient, and to a certain extent, of course, the selection of instruments. Although these cases that I have collected for this afternoon's clinic are all unquestionably in need of operation, yet I may say to you incidentally that before deciding upon the surgical correction of any septal deformity, you may find it an excellent rule to spend a week or two in subduing to some extent the chronic catarrhal rhinitis that is almost invariably present. Should you do this, I am quite confident that upon the reduction of the hyperplasia and the persistent engorgement of the turbinates and the mucosa generally, you will often be surprised to find that the operation which you had at first thought indispensable has become just as clearly unnecessary. And I may also say in passing that an operation should never be contemplated unless the symptoms occasioned by the deformity are of sufficient urgency not merely to excuse but to demand its removal. Cosmetic or artistic sentiment should not be allowed to affect one's judgment in matters of this kind. If there is no serious external deformity, if there is no such embarrassment of nasal respiration as to compel mouth-breathing, and not enough pressure upon the turbinates to provoke any of the nerve reflexes or to impede drainage from the accessory sinuses, a wide departure of the septum from strictly normal lines may be permitted to remain unmolested. In other and less technical words, the exercise of a little common-sense and a conscientious respect for the patient's point of view as well as your own, will do much to restrict that excess of nasal surgery which is now too common.

To consider first the correction of deformities of the septal cartilage, one well established principle should always be observed,

the preservation whenever possible of sufficient mucous membrane to wholly re-cover the area of operation. The substitution of cicatricial tissue for the normal membrane in this situation invites the drying of secretion, the formation of crusts and that frequent mechanical removal of them which leads to erosion, repeated epistaxis, and perhaps eventually perforative ulceration.

It is upon the cartilaginous portion of the septum that the operation known as submucous resection can be most readily performed, but even here this operation is by no means a simple one, and you will probably discover, if you have not already done so, that its satisfactory performance depends almost as much upon the temperament of the patient as upon the type of the deformity. The operation at best is not a brief one and, in spite of the almost complete local anæsthesia that can be obtained, the patient's nerve and self-control are liable to desert him before its conclusion. It will be a wise precaution, therefore, to select only such cases for this procedure, under local anæsthesia at least, as seem to possess sufficient poise and grit to permit you to complete it without such haste as must sacrifice skill. It is particularly the cartilage of the septum that affords the opportunity for the display of a great deal of surgical ingenuity in the correction of its deformities. Quite a number of special operations have been devised for certain types of dislocation and deviation, but if you will examine a few of the cases that we have here to-day you will see that each one will demand differences of operative detail that must be left to the cleverness of the individual operator. Should submucous resection be deemed inadvisable and in its stead the incision and refracture of the cartilage be practised, it is essential for a satisfactory result that the fracture of the fragments or flaps be so thorough that they can be subsequently retained in the middle line by gentle support without the necessity for the slightest pressure. The same principle applies with equal force when it is the osseous septum that is straightened by this method. The septal incisions are made much more accurately and the chances of a perfect replacement of the structure greatly strengthened if the Douglas perforator and curved knife are used instead of the cutting forceps made for this purpose. This later is, in a surgical sense, a very crude instrument. The line of greatest deviation is rarely a straight one and it is much

more closely followed by the knife under inspection than is possible by the forceps. The desirable support while union is progressing is best afforded by the McKernon splint. None of the many other forms are comparable to this one and the several perforated varieties are decidedly objectionable.

Finally, the removal of spurs and ridges from the septum can be readily accomplished either by knives and saws or by drills and fraisers driven by the surgical electromotor. The latter is much the more expeditious and in the removal of bony tissue is decidedly less unpleasant to the patient than is the hand-propelled saw.

Dr. James K. Young took up the subject of the etiology of arthritis deformans, and, at a later clinic with Dr. Willard, that of joint tuberculosis. Among the patients shown were cases of arthritis deformans, osteophytes, lateral curvature, and hip disease. This clinical lecture is in the hands of the EDITOR for publication in the September issue of the INTERNATIONAL CLINICS.

Dr. A. O. J. Kelley gave a lecture on chronic nephritis discussing particularly the diagnostic points and the classification of the different forms of nephritis from a clinical point of view.

The last lecture of the day was a clinical lecture given by Dr. Charles W. Burr ⁴ at the Philadelphia General Hospital, the subject being Alcoholic Insanity.

Among the more important clinics and demonstrations were those of Dr. John H. Musser, Dr. W. T. Longcope, the former EDITOR of the INTERNATIONAL CLINICS, Dr. Edward W. Martin, Dr. Edward Lodholz, Dr. T. Turner Thomas, Dr. G. G. Davis, Dr. Alfred C. Wood, Dr. Charles K. Mills, Dr. R. Tait McKenzie, Dr. G. M. Piersol, Dr. David Riesman, and Dr. W. G. Elmer, all of these being given below in detail.

FUNCTION OF THE HEART MUSCLE AND CARDIAC FAILURE

DR. J. H. MUSSEY.—The question of heart failure is one of the greatest importance from the clinical standpoint. The musculature of the heart is the most important element, and in the majority of cases will compensate for other defects, such as valvular lesions, etc. "Failure of compensation" is the common term for serious disease, but many conditions may be long continued without giving

⁴This lecture is promised for a future number of the CLINICS.

rise to any symptoms. The main point is that the symptoms referable to the heart are in the great majority of cases due to myocardial trouble, and are not seen in other conditions unassociated with this.

Neurogenic Theory of Cardiac Contractility Discussed Briefly.

The myogenic theory, according to which the contraction wave originates in the heart muscle and is conducted throughout the whole organ by means of the musculature, has recently gained prominence and even displaced the neurogenic theory. The heart muscle can contract independently of nerves for example, and this contraction can be kept up for a long period of time. Neither theory alone, however, is entirely sufficient. The effects of vagus stimulation and the accelerator mechanism may be mentioned in this connection. The cardiac action thus has a double supply of initiative to contract; this may be compared with similar double sources in other physiological actions, *e.g.*, the innervation of a gland and the hormones which also stimulate it. In the economy of nature such conditions are frequently met with and constitute factors of safety. It is, however, just possible that a certain amount of nervous activity is absolutely necessary in addition to the myocardial function.

The functions of the heart muscle are (1) *stimulation*, stimulus production resulting from chemical action; (2) *excitability*, the ability to respond to a stimulus by appropriate function; (3) *contractility*, the typical property of the myocardium as well as of other muscle tissue; (4) *conductivity*, by which the contractile impulse is conveyed; (5) *tonus*, the condition of slight tension, or absence of complete relaxation, corresponding to that seen also in other muscular structures.

The function of *excitability* is particularly manifest at the sinus venosus, and at certain cardiac nodes. The latter are small congeries of cells that are most readily excitable, and from them the initiated contraction wave spreads in all directions. This has been especially worked out in the lower animals and in embryos, etc., where the heart is a comparatively simple structure.

The result of *stimulation* and *excitability* is, of course, *contractility*. *Conductivity* has been well established by the studies of His and others: a band of fibres passes from the base of the heart

toward the apex, and following along this the contractile impulse spreads to the whole of the heart. *Tonus* is that condition which allows the heart to retain a certain amount of contractility, and will partly counteract a complete relaxation from any cause.

Pathological changes in these five functions are the causes that produce heart failure. It is not necessary that all of them be affected at once. Definite symptoms occur according to which ones are involved. Modifications of *excitability*, for example, give rise to a pulse and circulation which are abnormally fast or slow, as the case may be. Irregularities may likewise be caused, but these may also be due to other etiological factors, *e.g.*, sinus irregularity, juvenile or respiratory forms of arrhythmia, etc. Some of these may also be due to other causes, such as *vagus* action, for example, instead of to myocardial affection. Excitability of the nodes situated lower down may bring about a dissociated irregularity. A modification of the *contractility* is seen in cases of angina pectoris, the heart becoming overfilled with blood to a greater and greater extent. Failure of this function of contractility is indicated by clinical signs especially well in the cases of *pulsus alternans*, inefficient contractions alternating with efficient ones. *Conductivity* is affected in any lesion which partly or completely cuts off stimuli originating at the sinus, as in the "heart-block" seen so well in cases of what was formerly known as Stokes-Adams syndrome. All of these aberrations of function are more precisely diagnosed with the aid of instruments of precision. Disturbance of *tonus* leads to important changes in functioning of the heart.

These functions are associated closely with the myogenic theory, and upon them it has been largely built up. Failure of one or more of them will lead to heart failure; analysis of the condition of affairs will result in indications for treatment. Several methods and instruments will enable one to obtain a clear general notion of the state of affairs. Several improved practical tests give excellent results: (a) change of cardiac action with change of posture; a slowing of the pulse on reclining, as in normal individuals, is not seen in incipient heart failure; (b) the self-checking test; a weak heart becomes slowed after moving the arms about fairly rapidly, but this test has not seemed to us to be as valuable as most of the others; (c) testing by compressing the radials, fem-

orals, etc., will not increase the blood-pressure in those with weak hearts as it does in normal individuals. These crude tests are after all not so reliable as the more accurate instrumental ones.

The "third heart sound," as it has been called, is heard best with the patient reclining, especially if he lies on the left side; it can be most readily perceived at the apex or a little to the left of this. It occurs immediately after the second sound, and is not a definite murmur but very closely resembles a murmur. A failure to realize its significance has sometimes been disastrous, as in the final army and navy physical examinations where it has been found on reclining after vigorous exercise and mistaken for a symptom of serious defect. In such cases it is generally perfectly physiological, but it is probably more frequent in certain forms of pathological lesions, as myocarditis, valvulitis and adhesive pericarditis. In such cases, however, it is not of nearly so much diagnostic aid.

RESULTS IN EXPERIMENTAL HEART LESIONS

DR. W. T. LONGCOPE.—For the last three years we have been interested in studying by the use of experimental methods the results of lesions of the heart valves in dogs; these experiments are in part a repetition of the work of Rosenbach, Poper, Romberg and Hasenfeld, McCallum, Thayer and others, and have been used principally for teaching. It is therefore not the results of a well-planned scientific investigation which I am able to present to you, but rather a series of more or less random observations, made at different times during the period of our work. Two methods of procedure have been adopted. One might be called the physiological and the other the clinico-pathological. The first method consists in studying the immediate results of valvular lesions in the exposed heart of the dog. The second method consists in the clinical and pathological study of the later results of an experimental aortic insufficiency in a limited number of dogs.

There are a number of phenomena which may be well studied by the physiological method: first of all, it is possible to demonstrate to the student the position and beat of the normal heart; by appropriate methods the heart's action may be so slowed that the sequence of auricular contraction followed by ventricular contraction may be readily seen. Various artificial defects may then

be produced in the valves. By placing a ligature about the first portion of the aorta, a fairly accurate reproduction of an aortic stenosis can be made. On the other hand by passing the valvulotome, which has been devised by McCallum, down the carotid artery, one or more leaflets of the aortic valve may be torn and by this means the perfect reproduction of an aortic insufficiency may be accomplished. Again by passing the hook between the aortic valves and catching one of the *cordæ tendinæ* or one of the flaps of the mitral valve a mitral insufficiency can be readily established. Following these actual defects, murmurs develop which are precisely like those heard in the human being under similar circumstances. By placing the stethoscope directly upon the heart the transmission of the murmurs can be accurately followed. Not only can these defects in the valves be reproduced, but with the greatest ease one can also bring about relative insufficiency of the tricuspid and sometimes of the mitral valves. By pressing on the conus arteriosus an immediate dilatation of the right ventricle follows and with this a systolic murmur develops in the region of the tricuspid valve. It is transmitted to the right auricle where it is heard with the greatest intensity and where at times a thrill can likewise be felt. Such a relative insufficiency can be produced at will; with relief of the pressure upon the conus arteriosus the murmurs disappear. Finally the immediate effects of such lesions upon the lesser circulation can also be well seen and studied. By means of a mercury manometer attached to the femoral artery the effect upon the general blood-pressure of the lesions already described may be demonstrated and it is interesting to note that after even a severe aortic insufficiency the general arterial blood-pressure is sustained at the normal level. The experiments which I have hastily described give you some idea of the possibilities which are open to supplement the teaching of physical diagnosis.

The object of the second series of experiments has been somewhat different. It is possible by the very simple operation which I have described to you to produce aortic insufficiency in dogs under aseptic precautions, and to study the late effects of this lesion in a series of animals. By this method one may produce uncomplicated types of valvular lesions with foreknowledge of the exact anatomical defect, a condition which is obviously impossible to obtain

accurately in patients. Moreover one can be quite certain that at least when the experiment is started the heart muscle is normal; in patients of course this important factor can never be determined.

Following immediately upon the production of an aortic insufficiency the dogs developed a loud to-and-fro murmur which was best heard over the sternum. Synchronously there is a typical water-hammer pulse. Immediately after the animals recover from ether they are quite as lively as before the operation, and seem capable of taking as much exercise as a normal dog without obvious detrimental effect. If an aortic valve is punctured but not torn the lesion may heal perfectly, and at the end of a few weeks the valve be restored almost to its normal appearance. In four dogs, however, the valves have evidently not healed, and at the present time they present the typical double murmur over the sternum which is so characteristic of aortic insufficiency in man. Within a few days after the original operation, a systolic murmur can be heard at the apex of the heart and this murmur has been continuously present in five dogs which we have studied. In two cases at autopsy we have found that there was considerable dilatation and hypertrophy of the left auricle and it is quite probable that the systolic murmur is an evidence of a relative insufficiency of the mitral valve. Others have noted that hypertrophy and dilatation of the left auricle follows the production of artificial aortic insufficiency. This hypertrophy has been assigned by Hasenfeld, Romberg and others to a simple increase in the pressure in the left auricle, explained by the fact that it requires more pressure to force blood from the left auricle into the left ventricle during diastole, since at the time when blood is flowing from the auricle into the ventricle blood is likewise regurgitating from the aorta through the incompetent aortic valve into the left ventricle. These authors have apparently overlooked the added factor of a relative mitral insufficiency; although the hypertrophy and dilatation of the left auricle is in the last analysis due to increased pressure in the left auricle, it seems to us that an important factor in bringing about this increased pressure is an actual insufficiency of the mitral ring, which allows the back-flow of blood from the left ventricle into the left auricle during systole.

Now in spite of the development of all the signs of aortic insufficiency none of the dogs have showed during life the slightest

sign of cardiac failure. All of the dogs have been observed for over a year and one or two for 18 months and there has been no dyspnoea, no gastro-intestinal disturbances, and the dogs have been quite as willing and able to take a considerable amount of exercise as normal dogs. This is a fact to which we wish to draw especial attention.

Within the last few years the importance of the functional activity of the myocardium has been more than ever emphasized by many writers, and the way in which one of these animals succumbed serves to impress upon our minds how indispensable an intact myocardium is in valvular disease of the heart. One of the dogs which had been perfectly well up to the time of his death, though he had lost considerable weight, died very suddenly. At autopsy it was discovered that he had suffered from a slight bronchopneumonia, and besides other signs of an acute infection, there was an extensive acute myocarditis. We believed that in this case the acute lesion of the cardiac muscle was directly responsible for the death of the animal.

In the third group I must mention a number of failures which, at least from the point of view of the endeavor to establish a chronic heart lesion, were unsuccessful but nevertheless proved of much interest. In two cases after the production of an aortic insufficiency recovery from ether was very slow. The pulse was rapid, of small volume and finally diminished to the point of becoming entirely imperceptible to touch. Cough developed rapidly and numerous râles were heard on auscultation over the lungs. There was an expectoration of blood-tinged frothy fluid, and about an hour after the operation was completed the animals died. At autopsy a blood clot was discovered attached to the torn valve and partially occluding the aortic orifice. There was marked dilatation of the left side of the heart. The most striking thing, however, was an extensive œdema of the lungs; such an œdema can be looked upon only as purely of mechanical origin, since except for the inhalation of ether the influence of any toxic material can be eliminated. Another interesting type of accident was illustrated by a case in which a small thrombus formed upon the left flap of the aortic valve situated in such a position as to occlude the left coronary artery. Death followed rapidly. The chest was opened as soon as the pulse became imperceptible, and for some minutes after the heart was

exposed this organ continued to beat. Since the heart beat was slow, the regular rhythm first of auricular contraction then of ventricular contraction could readily be followed. Within a minute the regular rhythm was disturbed and every other auricular beat failed to initiate ventricular contraction. The condition was one of partial heart-block in which the rhythm was two to one. After about half a minute the rhythm changed for a second time and three auricular beats took place to one ventricular contraction. After this, the rhythm would alternate, first two to one, then three to one, then occasionally four to one, but at no time was the normal rhythm re-established. Finally the auricles went into fibrillary contraction and very soon the heart ceased beating altogether. It was possible therefore in this instance to watch the development of a heart-block. It is interesting to note that it is the left coronary artery, the one which was occluded by the thrombus, that supplies the auriculo-ventricular bundle through which the contractile impulse passes in its course from the auricle to the ventricle. It is quite possible that in this instance the auriculoventricular bundle was rapidly deprived of its nutrition and that functional death advanced more rapidly in this bundle of muscle than it did in the general musculature of the auricle and the ventricle. This, however, is merely a suggestion.

Finally I may say that the one point which impressed us most in these studies is the importance of the function of the myocardium for the favorable prognosis in cardiac disease. A single lesion of the valves themselves causes disturbances which are readily compensated for by the reserve power of the heart muscle. When, however, the function of the myocardium is in any way disturbed the results seem to be very disastrous to hearts which are the seat of valvular lesions.

After the lectures by Dr. Musser and Dr. Longcope, Dr. Wm. Pepper and Dr. G. W. Norris gave a demonstration of various sphygmomanometers, tracings being made in the case of a patient with heart-block. This was followed by a talk on cardiovascular therapeutics by Dr. D. L. Edsall; and Dr. Tyson concluded the symposium on diseases of the circulatory system with the lecture on the "Treatment of Cardiovascular Disease," which begins the present volume of the CLINICS. At the physiological laboratory Dr. Lodholz gave an interesting demonstration of an ingenious apparatus used in teaching the students in the physiological department.

MODEL ILLUSTRATING THE CIRCULATORY SYSTEM

DR. EDWARD LODHOLZ.—Dr. Lodholz showed a mechanical device illustrating many of the dynamic principles of the circulation. The arteries and veins were represented by rubber tubes, a compress being provided on the arterial side in a position corresponding to the arteriole area to represent the resistance of arterioles when contracted to a greater or lesser extent. The wide "capillary bed" was represented by a large glass bulb filled with pebbles to introduce the factor of capillary resistance. The system varied from the actual in being an open one, the water used not returning to the source, which was a reservoir that could be put at any elevation desired to reproduce the required pressure. Just beyond the reservoir was a mechanically operated valve which was opened and shut rhythmically to represent the pulsations of the blood column, and beyond this a stop-cock used to introduce resistance in order to duplicate such conditions as valvular stenosis. There was also a device for reproducing regurgitation. A manometer was connected with the main "artery" and tracings were made upon a kymograph illustrating various pathological conditions with striking exactitude. The apparatus is of especial value in enabling one change in the circulation to be made and studied independently of complicating accompaniments. Thus tracings were made illustrating the pure effect of valve lesions such as regurgitation independently of any compensatory increase of myocardial action, as well as together with such action. Hemorrhage and its effects on the sphygmographic tracing were shown free from the secondary changes of increased peripheral resistance and change in the rapidity of the heart that accompany it and mask its individuality in the living organism. Pulse tracings and various factors producing change thereof were also shown. A large number of interesting tracings that had been made by the apparatus were thrown on the screen by the projecting lantern, and their special characteristics demonstrated.

In the afternoon Dr. B. A. Randall gave a talk on suppuration of the ears and its treatment, laying emphasis on the results that can be obtained without operative measures. Dr. M. H. Fussell showed cases of cardiac and vascular conditions. Dr. W. G. Elmer considered the treatment of lateral curvature and flat-foot. Dr.

G. E. de Schweinitz showed ophthalmological cases from the hospital wards. Dr. De Forest Willard showed various phases of treatment of tuberculous joints, referring to the open air, mechanical and operative measures to be adopted. Old sinuses are treated by bismuth injection and by bacterin therapy after removal of carious bone. He also showed cases of congenital dislocation of the hips. Dr. B. A. Thomas gave a talk on bacterins in orthopædic surgery. Dr. F. H. Klaer and Dr. S. J. Repplier discussed arteriosclerosis and demonstrated cases. Dr. W. G. Spiller gave a lecture on spasticity and athetosis, in which the characteristics of these two conditions were gone over.

SURGICAL CLINIC, WEDNESDAY, MARCH 30TH

DR. EDWARD MARTIN.—This lady, a patient of Dr. Radcliffe Cheston's, was operated on at the Chestnut Hill Hospital nearly two years ago. She suffered from a painless and persistent hæmaturia without pus, unattended by either renal or vesical symptoms, for a period of three weeks. Neither calcium chloride in full doses, nor human blood-serum were of the slightest avail in checking the hemorrhage, nor was it markedly influenced by bodily rest. A pronounced anæmia developed. Examination of the urine showed undoubted tubercle bacilli and a cystoscopic examination demonstrated that the blood was coming from the left ureter. The diagnosis of renal tuberculosis was made. The kidney was turned on the flank, split from end to end and carefully examined. It looked entirely normal, except for a minute gray spot near one papillary apex—the kidney was removed. The patient made an uninterrupted recovery and gained twenty-six pounds in the course of a few weeks. Subsequent microscopical examination of the removed organ demonstrated the presence of tuberculous lesions not yet sufficiently advanced to be visible. The case is shown to illustrate the ease and safety of early operation, and the rapid and complete convalescence therefrom. A recent examination of the urine shows it to be perfectly normal.

The second case upon which operation will now be performed is one of recurring bilateral arthritis of the knee-joint. The condition has lasted for many years and has been characterized by repeated subacute attacks. In the intervals of these attacks the

knees remained weak, swollen, and distended with fluid but not particularly painful. The joints have been carefully treated in a variety of ways, by rest, by baking, by counter-irritation, by aspiration, washing with dilute carbolic solution, by manipulation and massage, by absorbents. No betterment followed any of these treatments.

When the patient first presented himself in this clinic his case was regarded as one of arthritis secondary to an infecting focus. In accordance with custom, a thorough examination was made, particular attention being devoted to the throat, nose and genito-urinary tract. He was found to be suffering from a chronic follicular tonsillitis. The tonsils were both removed; since this time there has been no recurrence of his subacute attack of joint trouble. It is probable that had this procedure been adopted after his first attack there would have been complete and permanent recovery. The repeated acute and subacute inflammations have, however, so altered the joints that even after removal of the cause they are no longer capable of returning to a normal condition. Because of the chain-like crepitation felt on manipulating the joint it was suspected that free bodies would be found. Some weeks ago by an incision carried from the outer border of the patella downward and outward the joint was freely opened and the excess of fluid evacuated. The synovia with the exception of that covering the cartilages, presented the appearance characteristic of fungating synovitis. The entire diseased surface was thoroughly swabbed with pure carbolic acid followed after a minute by alcohol, and the joint was closed. The patient made an uninterrupted recovery, with great diminution of the swelling, and returns to-day to have the other knee treated in the same way.

Theoretically we should always find an infecting focus in cases of chronic arthritis, which in spite of proper care exhibit steady progression or apparently causeless exacerbations. As a matter of clinical fact such foci are found in the minority of cases. They are usually encountered about the roots of teeth, in the throat, or in the urinary tract. In some instances relief of intestinal stagnation and fermentation is followed by great betterment of joint troubles. At times infection of the gall-bladder and the appendix may be the underlying cause of the arthritis.

The next case is one of renal calculus. The patient, a middle-aged man, has suffered from repeated attacks of atypical renal colic, and shows blood in the urine, usually in sufficient quantity to be obvious. He is entirely crippled from work. Pains have been left-sided and the X-ray shows in the region of the renal pelvis a fairly dense shadow about 2 cm. (0.8 inch) in diameter. He has never voided *per urethram* fragments of stone. The most convenient incision is one made from the costovertebral angle downward to a point about an inch in front of the anterior superior iliac spine. As can be seen the fascia enveloping the perirenal fat much resembles the peritoneum. The patient is somewhat fat, short loined, and has a large kidney with a short pedicle. As the organ is exposed it exhibits the lobulations of the fetal type. It is desirable, when practicable, to extract pelvic stones through an incision in the posterior wall of the renal pelvis, there being no tendency toward fistula formation if the ureter be patulous. The delivering of the kidney into the loin is more difficult than usual. Having been accomplished, palpation of the pelvis fails to reveal the stone. Therefore, with the vessels held by the hand of an assistant, it is needful to make an incision through the kidney substance. The point chosen lies a little posterior to the midline of the convex border. In this kidney, exhibiting to a marked degree the fetal lobulations, there is not seen either a Broedel's white line or the capillary dilatations that sometimes mark its course. On opening the pelvis and palpating both from within and without there is found a calcareous plate or induration lying on the posterior pelvic wall and running thence to the border of the hilum. No free stone is found. This abundantly accounts for the X-ray picture, though not necessarily for either the bleeding or the colic.

Concerning the question of visceroptosis, we have operated on a number of these cases and apparently with success, though it remains to be proven that similar success might not have attended prolonged rest in bed, careful feeding and the adaptation of a properly fitting abdominal support. Five cases of pronounced gastropptosis treated by shortening of the gastrohepatic omentum and looping the transverse colon up to the anterior belly walls by its attachment to the great omentum were all markedly benefited, gaining many pounds in weight.

The case presented to you now is one of intractable indigestion, associated with prolapse involving principally the colon and the stomach. The patient suffered mainly from colicky attacks of pain, obstinate constipation, and abdominal distention. There was exaggerated peristalsis. Medical treatment, colonic lavage, gastric lavage, and careful diet proving inoperative, the abdomen was opened. The stomach was but slightly dilated, the ascending and transverse colon were, however, the size of a man's arm. The descending colon was normal in size. The seat of obstruction was at the splenic flexure and there was neither tumor nor constriction of any kind here, but because of the elongated and prolapsed colon forming a sharp angulation it seemed desirable to try before resection and anastomosis the effect of colonic suspension. This was done by suturing the greater omentum to the anterior belly walls high up. The patient reports considerable improvement, but she is by no means well. At the present time she is living carefully fitted with an abdominal support so arranged that the colon will be pushed up by pressure applied to the lower part of the belly. The straight-front corset properly padded is used for this purpose.

The next patient, a physician, has had an extensive personal experience with abdominal supports.

His surgical history is one of considerable interest. Because of renal colic and blood and pus in the urine he was subjected to nephrotomy in another hospital. No stones were found. He came to this service wrecked in health, with recurring septic attacks, and with blood and pus in his urine, at times entirely disappearing, during which periods his renal and constitutional symptoms were greatly exaggerated.

The diagnosis of ureteral calculus was made. The ureter was opened by the oblique incision, the calculus was found in its lower portion just outside the bladder wall. Here, also, was an area of inflammatory induration suggesting a somewhat extensive periureteritis. As it was impossible to extract the calculus through the ureter it was pushed into the bladder and afterward expelled *per urethram*. Probably incident to inflammatory contraction and back pressure, or possibly because the kidney was too deeply vulnerezized to recover itself, the septic nephritis continued, so that finally a nephrectomy and ureterectomy were performed, the kidney

being almost completely disorganized with multiple foci of suppuration through it. From this operation there was a somewhat stormy convalescence, the wound requiring drainage above and below. Ultimately a condition of health such as had not existed for years was established, interrupted, however, by an occasional attack of pain and tenderness in the left pelvic fossa, by intestinal stasis and the symptoms of intestinal toxæmia. The extensive scar resulting from his repeated operations has yielded, allowing some prolapse. Moreover, there has developed, incident to muscular relaxation, some visceroptosis. After numerous trials the Doctor has come to wearing a Lentz abdominal support made in the ordinary way with reinforcements. In warm weather he uses a Storm binder. For his colonic infection he employs copious flushings with weak salt solution, assuming the knee-chest position for these flushings; he has derived great benefit from the ingestion of buttermilk.

Dr. H—— also has kindly consented to be here to-day, and he, too, has had some personal experience in the matter of abdominal supports. The major symptom from which he has suffered has been blood in the urine, together with other evidences of renal irritation. On examination his right kidney was found ptosed to the second degree. There is some relaxation of the belly walls difficult to account for since he has led in the main an active out-door life and has always been a strong man. The teaching in this clinic is that the kidney is normally a mobile organ and if possible should be left so, fixation being resumed for those cases only that cannot otherwise be bettered. Therefore an effort was made to devise a support to reinforce the weak abdominal muscles and keep the kidney in place. This has been to a great extent accomplished by a truss so arranged that its pad fits over the lower belly wall and presses upward and backward. With this arrangement Dr. H—— is able to meet the requirements of a very active practice without evidence of damage to his kidney and with comfort to himself.

Through the courtesy of Dr. Bassler, of New York, this corset is available for demonstration. It is practically a straight-front corset so arranged as to admit of easy lacing and application, and with the ribs hollowed in front so that upward and backward pres-

sure is made when the corset is in place. It possesses the advantage of applying pressure in the right direction and of enabling women to wear outer garments which accord with the modern fashion. Of course this cosmetic and utilitarian symphony will be insisted upon by them unless they are confined to the house or bed.

The reason that abdominal supports are so often non-efficacious is probably because the surgeon or physician refers his patient to the belt-maker and then dismisses him or her from his mind. The belt-maker usually sells the stock support which he may happen to have which comes nearest to fitting; such a one serves no other purpose than that of warmth.

An abdominal support applied for splanchnoptosis should make upward and backward pressure upon that portion of the abdominal wall which lies above the symphysis, below the umbilicus, and between the two iliac bones. It should carefully avoid either lateral or anteroposterior pressure above the iliac crests. But few of the supports designed seem to have even this as their object. Rarely does a support come from an instrument maker which does not require careful refitting. Certainly for women the carefully fitted Bassler or Gallant corset promises better results than any of the various belts made. It should always be applied with the patient in dorsal decubitus, supporting her weight on her shoulders and feet, the pelvis being elevated as high as possible.

Operation may rightfully be undertaken when, in spite of careful support and muscular training, life is rendered useless or even unbearable by the persistence of pain, obstruction, or intestinal toxæmia unrelieved by diet, hygiene, abdominal exercise, and the wearing of a properly fitted support. Operation may take the form of either suspension or anastomosis with or without resection, or resection with end-to-end suture.

Reverting to the case of renal calculus, it is interesting to note that the patient operated upon exhibited purely renal symptoms without any bladder reflexes; *i.e.*, at no time was there frequency, urgency, or pain on urination even in the midst of the attacks, nor was there the slightest difficulty or slowness in starting the stream. Moreover, radiations of his pains were not downward. He has recently been greatly bettered by the administration of pure acid sodium phosphate. Among the many remedies administered

for the purpose of dissolving calculi none have justified the claims made for them. Nor could it be shown that any of them administered by the mouth could produce a urine capable of affecting in the slightest degree calculi bathed in such urine. Lately there is both laboratory and clinical evidence to show that by the administration of pure acid phosphate of sodium there may be passed a urine in which if calcium oxalate calculi are placed they will be dissolved, and that such solution may take place in the body. It is needful for the patient to take about an ounce of this daily in very wide dilution, for instance, two or three quarts of water. We have had under observation one patient thus treated for a matter of some weeks. He has calculi on both sides; though the X-rays show no diminution in the size of his shadows he has been entirely free from colicky attacks during this treatment. Two other patients similarly treated, but without X-ray control, have shown a like symptomatic betterment.

In dealing with ureteral calculi passed into the bladder this grasping instrument which Dr. Young had made for me is of great service. Recently there came to the clinic a man with the symptoms of ureteral calculi and upon cystoscopic examination a calculi was found projecting from his left ureter. The instrument not being at hand, he was directed to return the next day. The stone disappeared from the ureter and was found lying at the bladder base. He exhibited pouching from a moderate enlargement of the mid-prostatic lobe. The stone was readily seized in this instrument and withdrawn, the whole procedure occupying not more than one or two minutes, and the patient immediately returned to his own home.

Concerning the question of prostatic enlargement, barring the predilection exhibited by large prostates towards malignant degeneration, they are hurtful only in so far as they obstruct the urine. This urinary obstruction is in the majority of cases due to an intravesical projection and its complete relief may be accomplished by removal of this intravesical projection. Under such circumstances total prostatectomy, involving as it usually does impotence, seems needless. Such a radical procedure is even less indicated in the case of the small fibroid prostates accompanied by spasticity or fibrosis of the internal vesical sphincter. Over-

stretching or division of this sphincter gives relief. Removal of the prostate without such division or overstretching simply aggravates the symptoms.

In regard to the avoidance of scarring after suturing, a variety of methods have been tried, including the percutaneous stitch. The immediate result of this latter is admirable, the line of suture showing only as a pin scratch. Later, however, there may develop considerable scar tissue. Recently the method has been to apply a running subcutaneous suture of No. 1 chromic gut placed in the most superficial fat layer; thereafter an overhand glover's suture of silk through the skin making absolute apposition. If the wound be properly closed the first dressing when removed should not stick to any point of raw surface. The skin stitches are taken out in three to five days, the skin edges being held together during this removal by the hands of an assistant and thereafter by straps. The straps used are the old fashioned resin adhesive plaster which require heating before they are applied. This plaster can remain on the skin for many days without producing the slightest irritation. It is also easily removed. With the use of zinc oxide plaster the patient often suffered more from the skin excoriation resulting from it than from the operation itself. It is true that the resin plaster adheres less tightly, but its grip is sufficiently firm for all purposes. When of good quality it will remain attached to the skin for one or two weeks. When removed there will be a perfectly normal surface.

The next patient represents a type of case but recently described by Jackson who, in a series of eight cases, considers an affection which, though fairly common, has been neither described nor been subject to special surgical consideration. Pain is the dominant symptom, often severe, sometimes only distinct distress. Usually it has a fixed time of origin and is progressive in its development. In its early stages oftentimes it has remissions of comparative comfort for variable periods. Later the pain or discomfort is practically constant, though marked by periods of acute exacerbations, oftentimes requiring morphine for relief. This pain is referred generally to the whole right side of the abdomen, but cannot be well localized to a particular spot. Tenderness amounts, as a rule, to

a hyperæsthesia and is often such as to render the pressure of clothes unbearable. It is obvious over the right side of the belly, though marked frequently at McBurney's point, just below the ribs. These localizations suggest the diagnosis of either appendicitis or gall-stones. Constipation is always marked and difficult to overcome. When entirely relieved there is usually transitory relief from pain. There is usually a mucus discharge from the bowels, though often this is determined only by careful examination of the fæces. Gaseous distention is marked during exacerbations. It is most pronounced over the cæcum, which is often greatly distended. The patient characterizes this as bloating. There is loss of weight, condition, and color, with the usual symptom-complex of auto-intoxication and neurasthenia. Obstinate gastric symptoms are not infrequently superadded. Attention to diet and efforts to minimize intestinal fermentation are also of benefit. The removal of the appendix and gall-bladder is of little avail.

Jackson describes as a demonstrable lesion on celiotomy the presence of the pericolic membrane lying like a thin vascular veil over the descending colon and interfering with its peristalsis. It is observed that the thin membrane is readily detached and can be entirely dissected off the colon and removed. Beneath this membrane the colon has a separate normal peritoneum of its own, or a membrane so similar in its character that it performs a similar function.

This patient closely corresponded to this type. She had resisted all medical treatment, was a constant sufferer and quite crippled because of her pain, and craved relief at any cost. On operation the ascending colon, which was freely movable and lying low because of some descent of the hepatic flexure, was found covered by a thin, poorly vascularized fibrous membrane, looking like a second layer of peritoneum. This was readily stripped off with very little bleeding, leaving the peritoneal coat of the gut practically intact. It merged insensibly with the peritoneum at the point of its colonic reflection from the parietes. Neither the cæcum nor the appendix were invested with this membrane. Microscopic investigation showed it to be made up solely of fibrous

tissue. The patient has exhibited marked betterment since operation, though she has not yet received adequate treatment for her general visceroptosis.

HABITUAL OR RECURRENT DISLOCATIONS OF THE SHOULDER

DR. T. TURNER THOMAS.—I have operated on eight cases of recurrent dislocations of the shoulder and thought that I could show at least three of them to-day, but I have been disappointed in my efforts to have them appear. I shall, therefore, say a few words about the condition and then substitute two cases illustrating another troublesome sequela of traumatic dislocation of the shoulder which receives practically no attention in the text-books.

Little or nothing is being done for patients with recurrent dislocations of the shoulder. A few wear braces for a while but usually discard them after a short time. They may diminish the number of recurrences of the dislocations but only by diminishing the movement of the arm. Operations have been done occasionally for this condition during the past 20 or 30 years. One of the first was for the production of an ankylosis of the shoulder, and of this I found two cases reported. I also collected 12 or 14 cases in which the head of the humerus was excised. In none of these cases did recurrences follow operation, but the function was much impaired. The first operation has never received the approval of the profession, while the second has been practically abandoned. The most successful and the one most frequently performed (about 40 cases have been reported) is that of capsulorrhaphy for the contraction of the relaxed capsule. Preceding operators had exposed the capsule by an incision through the deltoid, usually anterior. In my eight cases, I made the incision through the axilla, and I offer the following advantages for it: It exposes the site of the original tear in the capsule; the deltoid is not divided; if drainage is considered necessary it is dependent, and the scar is small and concealed in the axilla. Full functional results were obtained in all except for slight limitation of abduction in one and it is disappearing. There have been no recurrences, except for a slight subluxation in one, in an epileptic attack, although this patient has had other attacks since without a displacement. This recurrence was clearly due to an attempt to contract the capsule just

enough to prevent dislocations later, and not so much as to give rise to the necessity for prolonged mechanical exercises afterwards for the stretching of the shortened capsule. In this case the probability is that the cicatricial contraction in the recent scar in the capsule will induce the very slight shortening necessary to prevent further recurrences. At the worst a second operation will almost certainly produce a positive cure.

I now wish to call your attention to another troublesome sequela of traumatic dislocation of the shoulder, the pathology of which is much more obscure than that of recurrent dislocations. About two and a half years ago I saw a man who had had a dislocation of the shoulder about two years before. The dislocation had been reduced in a large hospital by one of the internes and the following morning the shoulder had been examined by one of the surgeons who said that the reduction had been properly made and he was sent home with the advice to carry out certain exercises. The patient now had great atrophy of the muscles of the shoulder, slight abduction, little rotation or forward and backward movement. I concluded then that the condition was probably due to the carrying back between the head and the glenoid of a torn portion of the capsule, but from my later experience it seemed evident that this was not the explanation.

About a year ago I saw two other patients, who also had had dislocations of the shoulder, with similar atrophy of the muscles of the shoulder, and marked impairment of motion. They had, however, a dropping of the head of the humerus, with lengthening of the arm on the affected side by about three-quarters of an inch. I thought that pushing between the two bones of the capsule was more likely in these cases, because of the separation of the bones. One man was sixty years of age and did not want an operation, while the other was younger and was anxious for operation if it promised relief. Operation showed too much length of capsule at the upper part. I overlapped the capsule there and took a tuck in the muscles, closed the wound with slight drainage which was removed in two days, and kept the arm at right angles with the body on a splint for ten days. The function now, as you see, ten months after operation, is almost perfect, and the articulating surfaces at the shoulder are in their normal relations. I have operated

on a young woman since for a similar condition with equally gratifying results, although the return of function is not as complete because there has not yet been sufficient time.

Yesterday I saw for the first time this man, who has, I believe, the same condition. The diagnosis of paralysis of the circumflex nerve has been made, and I cannot now show that this is not the proper diagnosis although I believe it is not. He has the same atrophy of the shoulder muscles, limitation of movement, dropping of the humeral head and lengthening of the arm, as the other patients had, and the condition also followed a dislocation of the shoulder. Two of the other cases showed by the skiagraph a fracture of the greater tuberosity, and in this last case the skiagraph is doubtful on this point.

In four of the five cases there was the same dropping of the humeral head, lengthening of the arm, limitation of movement and atrophy of the muscles, and they all followed dislocation of the shoulder. I believe that the persisting subluxation is not the result of paralysis but of a looseness of the upper part of the capsule from separation of the tuberosity or tear of the capsule, the head then dropping downward. If the head of the humerus is fixed in its normal position, a return of the normal condition of the muscle and the function will gradually occur. I intend to publish later in further detail the results of my study of this condition.

DEMONSTRATION OF ISCHEMIC PARALYSIS AND CONGENITAL LUXATION OF THE HIP

DR. G. G. DAVIS.—There are two kinds of surgery, one of which is more or less acute and often urgent for which radical procedures are employed; the other is the surgery of crippling, chronic affections sometimes congenital but more often the result of injury or disease. After the acute trouble has passed away the individual is more or less crippled and his earning capacity has been impaired or wholly destroyed. It is to this class that I wish to call your attention. The operative measures employed are reparative and conservative. They are most difficult, long and tedious in their performance and demand the most exact and careful technic. The first case is a typical example of this class. It is one of ischæmic contraction, described by Volkmann in 1869 and 1875. The boy,

now aged 12 years, five years and a half ago fell and broke his arm. There is a small scar on the upper anterior part and he says the bones came through at that point. Splints were applied and he says that the fingers began to contract while the splints were still on. He wore splints for 3 years in an endeavor to keep the fingers straight and he has worked with the hand endeavoring to improve its condition more or less ever since.

The result at the end of five years was that the hand was practically useless. It was flexed on the forearm at a right angle and the fingers could not be straightened. The ring and little finger seemed to have somewhat more motion than the others.

He was operated on five months ago, sufficient time thus having elapsed to give us some idea as to the result. An L-shaped incision was made across the wrist and for about 4 inches up the ulnar border. Some adhesions were found but the tendons and ulnar and median nerves were carefully isolated and the following tendons were cut, lengthened about three-quarters of an inch and sewed together again with fine silk: the long flexor of the thumb, the deep and superficial flexors of the index, middle, and ring fingers, the superficial flexor of the little finger, the palmaris longus, and the flexor carpi radialis. The operation consumed about two hours and the result can now be seen. He can extend and separate all his fingers perfectly. He can extend his hand at the wrist almost but not absolutely level with the upper surface of his forearm. He can oppose his thumb and little finger and he can flex all his fingers, but not completely. He is now beginning to use his hand to write with and for other purposes and it is still improving. It is now a useful hand and it was a useless one. While Volkmann ascribed the contraction to myositic degeneration Dr. Ginsburg in a recent article claims that it is a deformity in which muscle, nerve, and tendon structures share. He states that the contractions are the result of a myositis with accompanying nerve lesion. I have seen conditions resembling this affection so often follow nerve lesions that I am inclined to attribute the greatest importance to the nerve lesions and regard the tendon and muscle lesions as more or less secondary.

The case teaches two things: first, that in injuries of the forearm we should be on our guard against the occurrence of these

contractures. They begin to occur long before it is time to remove the splints. Secondly, that even after the lapse of years the trouble is not the hopeless one that it is usually regarded as and that careful operations can restore much usefulness to a useless crippled arm and hand.

The other cases are three of congenital luxation of the hip. The first is a boy of about 4 years. His right hip was replaced 7 months ago and yesterday for the first time the plaster cast was permanently removed. He walks of course with a limp because the joint is still somewhat stiff. On placing the limbs in a similar position of abduction with the pelvis level, measurement shows both limbs equal in length and the head of the femur can be felt in its normal position. There seems not the slightest tendency for relaxation to take place and with use the normal movements will in a comparatively short time be restored.

The method used in these cases to reduce the luxation is one which we devised a few years ago. The child is laid on the padded table or sand pillow with its face down and the affected leg hanging over the side of the table. The operator then grasps the affected leg with one hand and flexes the knee and thigh until the latter lies close to the child's body. With his other hand he then makes pressure on the trochanter posteriorly and pushes the head of the femur from its dorsal position forward until it can be felt in front. Then by to and fro movements the thigh is brought down until it is at right angles to the long axis of the body and the limb is then to be put up in plaster and held in that position.

The second child is one in which both hips have been replaced and put up in plaster in the so-called frog position. We are now having a steel and leather apparatus made for this child to use instead of the plaster. It is capable of being altered from time to time as desired, allows perfect access to the parts for examination, and when it is applied she will be allowed to go home.

The third case is a child seven years old in which both hips have been replaced. Instead of putting this child's legs in the frog position she is kept on a narrow bed with her legs hanging over the edges. This imparts a certain amount of internal rotation and tends to counteract somewhat the bad effects of anteversion of the head and neck seen in some of these cases.

She is the third child we have had in the same family. Her oldest sister had both her hips replaced by the writer in 1900, two years before the visit of Lorenz to America. One of these hips is perfectly normal but the other has to some extent relapsed. The next oldest sister was 9 years of age when treated for one hip. The hip was replaced and is in position, but as is the case with these old patients there is a certain amount of stiffness remaining which takes time to overcome. There are many cases of congenital luxation of the hip which pass unnoticed simply because the physician fails to properly examine the patient. If this is done the diagnosis is usually easy and the results of treatment later in most cases satisfactory.

THE TREATMENT OF HERNIA IN CHILDREN

DR. ALFRED C. WOOD.—The rational treatment of any abnormal condition must be based on an accurate knowledge of the cause of the trouble, as well as upon the manner in which a cure is brought about. It is unfortunate that the term "rupture" was introduced to apply to the condition commonly known as hernia, inasmuch as no actual tearing of structures occurs. It is well known that during the early months of fetal development a pouch of peritoneum protrudes through the abdominal wall at the inguinal region, and in the male passes into the scrotum; in the female into the labium. Under conditions that are considered normal, the walls of this peritoneal process become adherent either before birth or within a few weeks thereafter, and hence the "canal" is obliterated. That this process fails to become adherent in many cases is shown by the fact that a protrusion of the bowel into this canal is frequently observed in infants, a fact easily demonstrated by an examination of the sac of the hernia at the time of operation.

It is further confirmed by the reports of various observers, who state that at autopsy they frequently find this peritoneal process patulous in whole or in part. From these reports it would appear that this condition is present on one or both sides in fully one-third of all male children, if not even more. Sometimes the process is large enough to admit the little finger; in other cases its calibre is as small as a probe. As a further evidence a careful examination

of the average hernial sac in adults will show important resemblances to those sacs that are known to be congenital.

Opposed to this view is the common statement in text-books that inguinal hernia is due to a weakness of the abdominal walls in the inguinal region. An examination of the anatomy of the structures involved will show that Nature has provided for the numerous strains that are received at this point. The floor of the inguinal canal is Poupart's ligament. The roof of the internal inguinal ring is formed by the arched fibres of the internal oblique and transversalis muscles. When any stress is brought on the abdominal wall the resulting contraction of these muscles causes the fibres mentioned to lose the arched direction and to form a straight line which closes the ring. If the closure of the process of peritoneum has been complete and flush with the parietal layer, the strength of the abdominal wall at the internal ring appears, owing to this mechanism, to be ample. If, however, there is a patulous canal or even an infundibuliform condition any strain presses the viscera into this pouch, which not only results in the stretching of the muscles at the internal ring but also prevents efficient closure of the ring by the normal contraction. As hernia is almost invariably of very slow formation, this preparation of stretching goes on doubtless in almost all cases for a long time before any protrusion is observed.

If a patulous peritoneal process is accepted as the common cause of hernia, the use of the term "congenital," as applied to this condition, must be modified. As now employed, it signifies that the contents of the hernial sac are in contact with the testis, indicating that the whole peritoneal process has remained open. If the process becomes obliterated at the external ring, or just above the globus major, the funicular portion remaining open, the hernia is just as definitely congenital as in the former case. The important rôle of this persistent peritoneal canal is also shown by the fact that every operator appreciates the necessity of complete removal of the sac flush with the parietal layer of peritoneum in order to effect a cure, irrespective of what other steps may be employed. In fact, this total obliteration of the sac is about the only point in which all operations are alike. It would appear, therefore, that if the sac is properly obliterated or removed, almost any one

of the various operations for radical cure may be successful; if this sac is not effectively disposed of no method of operating or suturing is likely to succeed.

It is very generally stated that the application of a truss during childhood results in a cure of a hernia. This should be admitted only if it can be shown that the sac has been entirely obliterated by the truss treatment. The mere fact that a hernia does not recur for a few months or even years, is no proof that the sac has become adherent throughout, and hence no one can say that the hernia is permanently cured. As a matter of fact, we know that peritoneal surfaces once fully developed never adhere unless there is excessive pressure or inflammatory action. To apply sufficient force by means of a truss on the inguinal region to cause adhesion of the vaginal process of peritoneum would certainly be injurious to the structures affected. If the pressure is sufficient merely to prevent the protrusion of the bowel, adhesion of the apposed peritoneal surfaces cannot be expected. What the truss treatment does do when it is thought to be successful is to prevent the hernia from coming down as long as the truss is worn. If no protrusion is permitted for several months shrinking of the lumen of the canal undoubtedly takes place, which offers some resistance to a recurrence of the protrusion. In addition, the strengthening of the fibres of the internal oblique and transversalis muscles that is thus favored acts as a further obstacle to recurrence, so that the hernia may appear to be cured. It seems certain, however, that in many cases the canal is still patulous and may be the predisposing cause of a hernia at a future time. In other words, the most that can be expected from the use of a truss is to place the patient in the class of those who have a persistent peritoneal inguinal canal, but in whom no protrusion is apparent.

The operation for the cure of inguinal hernia during childhood is particularly successful. As has been shown by Russell, ligation of the neck of the sac at the internal ring is all that is necessary to bring about a cure. The deep muscles need rarely be sutured to Poupart's ligament. The ligation of the neck of the sac is comparatively simple, because the canal is less oblique than in the adult. As a recurrence is prevented, the strength of the internal ring is rapidly restored to the normal, the muscles developing as

the child grows. The condition is therefore the same as though hernia had never existed.

As to the best time to operate in children, no uniform rule has been accepted. Some surgeons fix four years as an appropriate time, whilst others operate at two years. In the opinion of the writer, the age is the least important factor. It should not be done, except to relieve strangulation, unless the child is in good general health. It need not be done until the second or third year, if the hernia is small and is easily held by a simple appliance. The operation may be properly advised at any period if the hernia is very large, provided the child be in good health. Operations for strangulated hernia have been done during the first few days of life, with normal recovery and satisfactory results in all particulars.

Wounds in children under favorable conditions heal very promptly. It is more difficult to protect dressings from soiling in the case of infants and young children than in adults, and provision must be made to prevent contamination of the wound in this way. Usually a collodion dressing may be applied. Whether this is done or not, the dressings must be protected and changed as frequently as they become soiled.

In recommending operation as a routine treatment of inguinal hernia in children, in the absence of complications, it is assumed that an experienced surgeon and suitable facilities are available. In the absence of these essentials the child had better take its chance with a truss. The operation under the most favorable circumstances may show a small mortality from unforeseen complications. In advising parents, it is always proper to frankly admit this possibility.

The annoyance incident to the prolonged use of the truss, the uncertainty as to the relief being permanent, the constant probability of a recurrence of the hernia with its disabling effect, because it does reduce the efficiency of the individual, and finally the possibility of sudden strangulation at any time, seem to the writer to outweigh many times the very slight risk of an operation performed under proper conditions. It must be remembered, also, that hernia itself has a mortality.

In the afternoon of Wednesday, March 30th, Dr. E. H. Goodman gave a talk on chloride metabolism and its importance in cases

of nephritis. This paper, illustrated with charts, will appear in the September CLINICS. Dr. H. K. Pancoast exhibited a large number of X-ray plates from cases of visceroptosis (Figs. 5, 6, 7, and 8).

SPINAL LOCALIZATION IN SOME OF ITS PRACTICAL RELATIONS, ESPECIALLY WITH REFERENCE TO TUMORS AND OTHER
FOCAL LESIONS

DR. CHAS. K. MILLS.—Much less has been written about the subject of spinal localization than about that of cerebral localization, and therefore probably the former is less well known, especially to the general practitioner. As it is impossible to cover the ground thoroughly in a single lecture the aim will be to be suggestive rather than pedagogically systematic, and to point out instances and examples of the application of the main principles. In the first place a general plan or scheme of subdivision of the spinal cord according to levels will be given. One which will answer for most practical purposes is as follows:

1. The upper cervical region which includes the first to fourth cervical segments.
2. The cervicothoracic region, which includes the fifth cervical to the second dorsal or thoracic segment.
3. The middle thoracic, extending from the third to the seventh dorsal segments, inclusive.
4. The lower thoracic including the eighth to the twelfth thoracic segments.
5. The upper lumbar, from the second to the fourth lumbar segments inclusive.
6. The "epiconus" which includes the fifth lumbar, and first and second sacral segments.
7. The conus or lower extremity of the cord, including from the third to the fifth sacral segments, inclusive.

These subdivisions of the cord are of course entirely arbitrary, but usually a focal lesion such as a tumor can be related through its motor, sensory, reflex and other functions to such regions. The cervical region might be divided, however, with equal advantage into three subdivisions, an upper, middle, and cervicothoracic. In giving these subdivisions it must be observed that they are segmental. Some confusion at times arises from not bearing in

Fig. 5.



Extreme degree of gastropotosis, sagging type, with considerable dilatation, which is maintained at present by the evident lack of motility and the extremely low position of the greater curvature. A duodenal "traction kink" is known to have been a factor in this dilatation, but is no longer operative, as is explained later, although the anatomically low but relatively high position of the pylorus would seem to suggest the existence of such a form of mechanical obstruction still. At one time retention was a prominent feature in this case, but at the time of this examination she did not have as much retention as would be expected from the radiographic appearance. These facts were readily explained by the findings at a recent operation (soon after making the radiograph). The patient had had a previous operation for gall stones, and it was found that adhesions had formed afterwards and had partially elevated the congenital low pylorus and duodenum, and also straightened out the duodenal "traction kink," and as a result of this sequela of the first operation the patient was greatly relieved of her gastric symptoms, which were formerly very marked. (See Fig. 6.)

FIG. 6.



Extreme degree of ptosis of entire colon, in same case as Fig. 5, examination made eighteen hours later. The transverse colon especially is involved, and the ptosis is commensurate with that of the stomach, and can therefore hardly be regarded as an active factor, at least at present, in the extreme degree of gastropptosis. The original radiograph shows a moderate degree of ptosis of the liver and the right kidney.

FIG. 7.



Ptoisis of entire colon. The degree of ptoisis of the colon in this case is more than commensurate with that of the stomach, in the mechanism of which it is probably a factor. The slight degree of ptoisis of the liver and right kidney, shown in the original radiographs, tends to substantiate this view.

FIG. 8.



Radiograph of sigmoid, which suggests a slight redundancy or extra loop in the free portion, with a tendency toward obstruction just above, at the junction of the free and more fixed portions. This was further suggested by the difficulty encountered in introducing the bismuth. At the operation no distinct redundancy was found, but the appearance in the radiograph suggesting an extra loop was substantiated, and the cause of the condition was found to be an adhesion between two portions of the mesosigmoid. It is quite possible that this could have produced a certain degree of obstruction when the gut became distended from above.

mind the distinction between segments, root areas, and vertebral subdivisions. These do not always correspond.

Diagrams have been prepared indicating these differences; one, for instance, indicating the relation of the bodies and spines of the vertebræ to the segments of the cord, and to the space traversed by the nerve roots to the points of exit or entrance of the nerves; another indicating the segments of the cord in which are situated various reflex and other centres; still another indicating the manner in which segmental distribution to the periphery of the body occurs; and a fourth indicating the peripheral cutaneous nerve areas, etc.

Just as the brain has its centres for all movements brought about voluntarily, so the spinal cord, though not exactly in the same way, has its centres for special movements. Note that motor centres, so-called, are for movements, not for muscles. It is necessary to know that movements are controlled by the various segments of the cord singly or combined. Time will not permit us to take up the movements of the regions controlling them in detail, as the lecture is intended to be in part at least clinical; some ideas and suggestions will be thrown out, and these will be applied to the two cases before us, one a case of upper cervical lesion and the other one a lesion of the epiconus. In connection with these some remarks will be made upon other cases recently under observation.

In the first region which we have to consider, the upper cervical, are centres for comparatively few movements; very few muscles are involved, some of those moving the head (sternocleidomastoid, trapezius, longus colli, etc.). From the middle to the lower border of this division are centres for other movements, as those of the diaphragm, represented between the second and the fourth cervical segments. When the fourth segment is reached movements of the upper extremity begin to be represented, as for instance, those performed by the deltoid and biceps. It should be remarked parenthetically that movement representation is no more sharply marked off by separate segments than is segmental sensory representation, as shown by Sherrington and others, and as will be recalled later.

If one falls into the habit of philosophically thinking over these matters of localization, he gains points of advantage and is able to appreciate the rationale of the subject from practical ends, without too much memorizing. For example, the supinator longus and the

biceps, which are more or less together, have their centres close together in the cord. The triceps, which extends the forearm, as in striking and swimming, and the extensors of the wrist and of the fingers, are all represented in much the same general region, the lower cervical. Many of the movements of the hands and fingers are governed from the seventh and eighth cervical and uppermost thoracic segment. Flexion of the wrist and flexion of the phalanges go together. The first dorsal marks the site of control for the interossei, and also of the small muscles of the thumb and hand. So one might proceed down the entire length of the cord.

The reader is referred for a full presentation of this subject to any good work on neurology containing tables such as those of Starr, Dana, Leube, Seiffer and others.

Leaving the subject of motor localization and taking up that of sensory localization, the subject becomes a little more complicated and students often find in it much difficulty. Sensation as represented in spinal segments and nerve roots does not follow the same distribution as indicated for the peripheral sensory nerves in works on anatomy for instance. In the cord and in the posterior roots of the spinal nerves before they unite to form the nerves proper representation is preaxial and postaxial rather than indefinitely circumscribed areas, like those indicated for peripheral nerves. This means that one really needs to know the skin region corresponding to every segment and the peripheral distribution of each one of the posterior spinal roots. In this way the clinician gets one of his most important means of differentiating lesions of the peripheral nerves or the nerve plexuses from those of the cord or roots by the different grouping of the areas of anaesthesia in the parts affected.

Certain newer points must also be kept in mind. From a basis of anatomical study one may make a mistake of two or three segments from not keeping in mind physiological facts, as for example, that of segmental overlapping. In the neighborhood of a spinal lesion certain segments may be left functionally intact and these may take part in the representation of a function which would otherwise have been abolished by the injury.

In the case of the reflexes, if three segments are concerned in the control of a certain act, the destruction of one or even two of these may not completely abrogate the reflex.

The course which sensory roots take after entering the neural axis has sometimes an important bearing upon the exact regional localization. Passing into the cord by the entrance root zones, these root fibres, after entering their receptor cells, then take an oblique course cephalad towards the periphery of the cord in which are located the tracts for the transmission brainward of sensory impulses. It has been determined by histopathological and physiological observation that about five spinal segments are traversed before the fibres from one entering zone reach their columnar destination. Applying this fact to a lesion, as a tumor, it will be seen that if the growth be situated so as to destroy an extramedullary sensory nerve root the result would be confined to a single segment or to only one or two. If, however, such a lesion was intramedullary, the interference of function might be with four or five segments.

Another subject of much importance in connection with the localization of spinal lesions is that of the position of the various reflex centres. For example, knowing the cremaster segmental representation and finding the reflex absent on examination, may be of great assistance in making a diagnosis; in like manner, phrenic symptoms, *e.g.*, hiccough, or loss of diaphragmatic respiration, point with no doubtful indication to the site of the trouble in the cervical cord. The ciliospinal centre of the lower cervical and upper thoracic regions controls certain pupillary phenomena of great practical importance. Further down in the thoracic cord are the epigastric reflex centres, and still lower the abdominal. About the second to fourth lumbar segments, a most important centre from the diagnosticians' point of view is that for the patellar reflex, which probably has some representation in two, and possibly three segments.

In the upper part of the sacral cord, from the first to the third segments, is to be found the centre included in the Achilles reflex arc. In the last three sacral segments, the third, fourth, and fifth, the vesical, anal, and genital centres are situated.

Besides these centres related to well-known functions another method of aiding the memory in questions of localization is through knowing what fixed landmarks in the body are situated in a sensory area represented by certain segments of the cord. Thus the

umbilicus is known to be situated at about the level of distribution of the tenth thoracic segment; therefore a lesion which has its highest level of sensorial change about the site of the umbilicus will be known to have its upper pole about the tenth or at the most the ninth thoracic segment.

In concluding the lecture two cases illustrating spinal localization in regions of the cord remote from each other will be presented. One of these two patients is a man who gives a history of having fallen into a well about thirty feet deep. The lack of immediate important results is worth noticing. By X-ray investigation no bone lesion was made out. It was found that at first the patient was totally paralyzed and anæsthetic in both lower extremities. He had to be catheterized for seven weeks, but had no dribbling of urine, so that the trouble was not due to paralysis of the bladder. He also at first had rectal involvement. Motion in the lower limbs was entirely gone for at least a week. After this his condition gradually began to clear up, eventually the bladder and bowel functions returned, sensation improved greatly, and the areas of anæsthesia became less and less until finally they disappeared entirely.

The patient still walks with much difficulty, and shows a form of *steppage* gait. When we tap his patellar ligament we at once make a study of his third and fourth lumbar segments. From the response it is obvious that they are in good condition. There is a tendency to ankle-clonus on the right, the side most affected, but he is able to do practically nothing in the way of dorsal flexion of the feet. The Achilles reflex was retained on each side, showing at least the partial escape of the Achilles centre. No Babinski response can be elicited, but he has complete toe-drop. Yesterday his sensation was tested and found to be entirely normal. In all probability he had concussion with hemorrhage, but no fracture. The hemorrhage must have been largely medullary, and was probably largely limited to what we have defined as the epiconus, which includes the fifth lumbar and first two sacral segments. During convalescence the area of the lesion contracted as the hemorrhage was gradually absorbed, leaving only a comparatively small residual epiconal lesion. It is in this epiconal region that the movements of raising the foot are localized; also the ham-string and tibialis

anticus movements. Perhaps a word regarding treatment may be said in connection with this case, that is, as to the importance of waiting. The laminectomy would have been worse than useless in such a case.

The second patient is a man who fell down a shaft 170 feet clear and landed in about twelve inches of water. He felt only a little numbness of the hands at that time and was not unconscious. He was admitted to a hospital and was dismissed after a week's treatment, as having no serious involvement of the spine, and it was not until some months later, when trying to shovel, that attention was again called to his condition, he having at this time very severe shooting pains and tingling in the arms and hands. At this time he had, and has even to-day, some weakness of the upper arm movements, but his hands, grasping power, etc., are normal. He is unable to move the head backward or to turn it to either side. At first there was some pain radiating downward over the front and back of the chest, and down the arms from the region of the neck. An X-ray photograph was finally taken and showed a dislocation forward of the second cervical vertebra upon the third, a complete crush of the third and partial of the fourth cervical vertebra. Some of these pains shooting downward indicate a point at about the third or fourth cervical segments, while the hand movements, corresponding to the lower cervical segments, are not and have not been affected.

Another patient, a case of tumor of the cervical region of the cord, not exhibited here to-day, but seen by me some weeks ago, suffered severe pains in the shoulder which would not yield to treatment. Later these pains radiated down the arm. Then followed a little weakness of the left arm and hand, this weakness increasing and involving the hand muscles to such an extent that the finer movements of the hand could not be elicited. Then followed an insidious loss of power in the left leg. The above symptoms continued and the patient was brought to the hospital for treatment. Examination showed an increase in the Achilles tendon and patellar tendon reflexes on the affected side with decreased reflexes in the arm. An X-ray photograph was made and showed the condition which had already been diagnosticated, namely, a tumor formation extending downwards from the fourth and fifth cervical vertebrae.

A laminectomy was performed, and a growth was found inside the dura. This was a so-called fibroma, or rather endothelioma, as Mallory believes that all such neoplasms should be classed with the endothelioma. The patient made a good recovery. A fuller report of this case will be made in a paper on tumors of the spinal cord, to be presented before one of our national associations.

From the localization standpoint this case was extremely interesting, as it gave the very striking symptom-complex of a tumor in the lower cervical region. The symptoms which were of a special focal significance were impaired reflexes in the upper extremity while in the lower extremity these were increased, the explanation being found in the direct involvement of nerve roots in the cervical region and involvement by pressure of the pyramidal tracts.

This patient presented after the operation a new symptom-complex of most interesting character. The pupils were not affected before the removal of the tumor. After recovery from the anæsthetic it was discovered that the patient had a contracted pupil on the side of the operation, and it was also observed that a partial ptosis was present, and possibly some slight retraction of the eyeball. These symptoms were probably due to injury to the rami communicantes between the cord and the sympathetic ganglia, it being remembered, as I have already indicated, that the ciliospinal centre so-called, is situated in the lower cervical and extreme upper thoracic region.

I have said but little in this lecture about the general symptoms of spinal tumors and of other lesions of the cord, as my object has been rather to fix attention upon focal symptomatology. In the case of tumors, however, it must be remembered that such symptoms as pain in the back and neural pains, rigidity, bony enlargement, change in percussion note, etc., may be regarded either as general or as focal symptoms. Röntgen ray examinations are of great importance in the diagnosis of spinal lesions, especially fractures, dislocations and tumors.

SURGICAL CLINIC, THURSDAY, MARCH 31ST

The first operation was the suture of a fractured patella. Catgut is used instead of silver wire as it is not likely to break where it is tied, avoids the danger of necrosis from pressure of the wire,

and is all that is necessary to bring the fragments into close apposition until they unite, the firm pressure and tensile strength of the wire not really being necessary.

Neurological surgical cases were shown: One was a cerebellar tumor with chronic hydrocephalus; another a case of acute circumscribed serous meningitis.

Dr. Speese discussed connective-tissue tumors of the jaws, especially epulis and sarcoma.

This was followed by an operation, a combined hernia and hydrocele case in a child.

A demonstration was given of the collection and use of carbon dioxide snow for local application. By wrapping the outlet of the container with chamois skin the frozen carbon dioxide is caught in this in the form of a thick cylindrical shell or an almost solid rod. This is used as an application to a variety of superficial conditions.

Dr. Thomas showed cases in which bacterin therapy was used. One was a case of sinuses of the hip and thigh which had been operated on two or three times; tuberculin tests were negative, and the *Streptococcus aureus* was found. Another was a similar case of *Streptococcus aureus*. A third case was one of Pott's disease and psoas abscess in which tuberculin therapy was used.

Dr. Speese showed a number of X-ray plates illustrating fractures of the metacarpal bones and discussed the treatment of these conditions.

Dr. Sweet followed with a lecture on the ductless glands in surgery, considering especially the suprarenal. The recent German work on the causation of goitre by the water of certain springs and Cushing's work on the functions of the pituitary were discussed. The importance of the chromaffine cells of the adrenals, etc., was considered, especially in relation to the loss of chromaffine substance in certain conditions, such as status lymphaticus. Likewise the giving of various anæsthetics, *e.g.*, ether, has been found to produce quite a decided loss of chromaffine tissue. It may be gradually regenerated after some length of time following the ether, but in rabbits which had been kept under the anæsthetic for five hours continuously it was found to be almost entirely lost. In the last few years Dr. Sweet has been studying the relation between the

adrenal and the pancreas, as they probably have functions other than the ones usually attributed to them. Infectious diseases and other acute processes have been found to affect the adrenal and cause loss of chromaffine substance. [Tracings of blood-pressure as influenced by adrenalin were shown and specimens of the adrenal gland, normal and after etherization, were passed around.] The tracings probably do not show the effect of adrenal action for as long a time as the adrenalin is actually present, as there is a compensatory action of some sort present which produces a counteracting effect.

This was followed by a discussion of chromocystoscopy by Dr. Thomas, including its technic, rationale, diagnostic value, etc.

THE TREATMENT OF PHYSICAL DEFECTS IN STUDENTS

DR. R. TAIT MCKENZIE.—Recently it has been possible to obtain complete records of the students' work in physical education at the University of Pennsylvania through the entire four years of their course and to reduce statistics as to the results secured. A marked increase in height, weight and chest girth can be demonstrated. About 50 per cent. of 1200 men entering the class show bad carriage, flat-foot, slight lateral curvature, round shoulders, or some similar condition.

The regular gymnasium class work does not fit all individuals and in many cases personal work must be outlined to suit special cases. For example, we have arranged on a card a special set of exercises for the man of mature years, perhaps engaged in business, and taking a few courses of special work at the University. In these the most important aims are the satisfactory expansion of the chest by deep breathing, the development of the usually weak muscles around the waist, and the improvement of the wind. There are also special sets of exercises arranged to correct round shoulders, to remedy a defect in which one shoulder is lower than the other, sometimes as much as $1\frac{1}{2}$ inches,—a defect which is commonly concealed by the tailor and so kept from assuming as much importance in the student's mind as it would otherwise do,—to counteract a slight lateral curvature, a tendency to abdominal prolapse, and even unduly patulous abdominal rings with a tendency to the establishment of hernia.

The special exercises for men of a sedentary habit take about 15 minutes and are enough to keep a man in good condition even if he is unable to take other exercise. In the exercises for round shoulders the proper standing position is of the greatest importance; it is also extremely fatiguing in many instances where the individual is unaccustomed to it. Abdominal breathing is universally neglected in this condition, hence special attention is given to it. In the cases of shoulder irregularity it is almost always the right shoulder which is lower than the left, the opposite condition being much rarer. The exercises in this case are likewise much like those for round shoulders but performed with one arm, the one on the lower side, instead of with both. Spinal curvature is treated only in its simplest and mildest manifestations, as the more severe grades are usually associated with compensatory curves and rotations which complicate the case too much for ordinary gymnastic treatment. In the cases of possible danger of hernia the exercises must be carried out with due precautions, but properly performed they are capable of causing a diminution in the size of the abdominal ring by developing the oblique muscles; for example, an abdominal ring which would admit two fingers may be so reduced as hardly to admit the tip of one. During these exercises the fingers are placed like a truss so as to guard against any possibility of actually causing a hernia if the exercises should prove unduly severe. Many cases of hernia result from the abdominal muscles being surprised, as it were, or unexpectedly caught off their guard, and these exercises inspire in them a sort of alertness or self-consciousness which prevents such a factor in the production of a hernia, for many cases of hernia have had as the exciting factor a strain much slighter than one which the patient had been previously accustomed to undergo repeatedly without any ill effects.

Another condition which can be much benefited by exercises is that of flat-foot, as is shown by the tracings made of the impress of the foot. These are procured by brushing the sole of the foot with a mixture of glycerin and ferric chloride, and afterward treating the impression with tannic acid. Some of the cases respond very poorly, but in others a great deal of improvement can be effected. Constipation is also treated successfully by suitable exercises in many cases.

In the afternoon of Thursday, March 31st, Drs. Siter, Uhle, and Mackinney gave a demonstration of syphilitic patients at the Philadelphia General Hospital. Cystoscopes were shown, and the respective advantages of the direct and indirect patterns were compared and contrasted. The technic of cystoscopy was explained and demonstrated individually to the audience. Further demonstrations were also given in the Pathological Department.

COMMON GASTRIC DISEASES

DR. G. M. PIERSOL.—Attention was called to the frequency with which gastric diseases are encountered in a medical dispensary, as evidenced by the fact that a little over fifty per cent. of all new patients give among their chief complaints symptoms referable to the stomach. In only about half of this fifty per cent., however, is the primary disturbance found to be gastric, the gastric symptoms in the remainder being the result of some chronic infection or inflammation elsewhere in the body or due to some chronic vesical or metabolic disease. In view of this fact, the importance of a thorough general examination was emphasized, since the successful management of these cases depends entirely upon an accurate diagnosis.

The importance of examining the gastric contents, obtained one hour after the administration of an Ewald test-breakfast, in all patients whose symptoms suggest the existence of a gastric condition was next discussed. It was pointed out that the passage of a stomach-tube was a simple, harmless procedure, rarely objected to by the patients, and thus far free of untoward results, although the method has been employed in a large number of cases. The technic of passing a stomach-tube was explained and illustrated by the removal of several test-meals from patients.

After calling attention to the differences in the macroscopic appearance of the gastric contents in various conditions of the stomach, it was shown that this method of examination furnished valuable information about the chemical composition of the gastric secretions, the digestive power of the stomach, and the gastric motility, as indicated by the amount of retention.

Inflation of the stomach through the stomach-tube as an easy and reliable method of determining its size, shape, and position, as

well as the condition of the pylorus, was then taken up and demonstrated.

Several cases were shown, one a patient with ptosis and dilatation of the stomach and a secondary hyperacidity, who illustrated the ill effects of the "stomach-tube habit," as well as marked argyria. A second patient showed the nervous phenomena frequently associated with hyperchlorhydria and hypersecretion, and a third case of alleged "indigestion" exhibited a typical clinical picture of gastric ulcer.

In conclusion the management of gastric neuroses was briefly dealt with, especially with reference to the importance of appropriate dietetic and hygienic measures.

On Friday afternoon Dr. A. F. Howell gave a demonstration of a method of treating the sputum with what is essentially a strongly alkaline hypochlorite solution, and then sedimenting the fluid mixture and fixing and staining the sediment.

Dr. A. A. Stevens gave a lecture on the earliest indications of phthisis, laying especial emphasis on the subjective symptoms.

A clinic was also held in the obstetrical department on Friday morning. Dr. W. R. Nicholson gave a demonstration of the use of the cystoscope and ureteral catheterization, emphasizing the advantages of the methods of distending the bladder with fluid instead of with air.

Dr. Richard Norris discussed and demonstrated the methods and technic of inducing premature labor, considering especially the use of rubber tubes larger than the ordinary bougie, and various forms of dilatable rubber bags.

Dr. J. C. Hirst performed an Emmet's operation for repair of the perineum and cervix.

Dr. B. C. Hirst performed a hysterectomy for traumatic perforation of the uterus.

TREATMENT OF INJURED EYES, WITH DEMONSTRATION

Drs. DE SCHWEINITZ AND CARPENTER.—The first operation was for a foreign body embedded in the cornea. This was followed by a cataract extraction.

A rabbit with a metallic foreign body in its eye was then treated with the Haab magnet, the indirect method being demon-

strated in which the particle is attracted around the lens into the anterior chamber at the middle of the posterior surface of the cornea. The foreign body is then removed through a small incision in the edge of the cornea, a thin flat tip being used on the magnet for this purpose, and care being taken to avoid entangling the particle in the iris.

Another rabbit's eye showed ulceration, iridocyclitis, and hypopyon due to an infected foreign body. The method of X-ray localization in the eyeball by shadows thrown in three directions, with the measurement and plotting on a schematic diagram of the three co-ordinates thus obtained was explained, and the sclerotic was incised over the point thus indicated and the foreign body drawn out through the incision by the direct method of using the magnet. The coherent and semisolid nature of the leucocytic mass in the bottom of the anterior chamber was well illustrated in this case; and the procedure, first suggested by Randolph of Baltimore, of irrigation of the anterior chamber to wash out any remaining infected material was demonstrated.

PLEURISY

DR. DAVID RIESMAN.—Dr. Riesman showed two patients, both young Italians, with pleurisy. In the one the disease had come on after a wetting, and the other without any apparent cause. There was nothing noteworthy in physical signs in the one case, in the other the breath sounds at the site of the effusion had a distinct bronchial quality. So marked was this that the students who saw the case were of the opinion that the man had pneumonia. Both patients were tapped; in the one about 1500 c.c. (3 pints) and in the other about about 500 c.c. (1 pint) of straw-colored serous fluid was removed.

Dr. Riesman dwelt upon the difficulties of the diagnosis of pleurisy. Such difficulties may be due to:

a. The location of the inaugural pain, which may be seated in the abdomen and suggest appendicitis, peritonitis, or gall-stone colic.

b. The physical signs, as illustrated in one of the cases in which the presence of bronchial breathing suggested pneumonia. Diminution or absence of the tactile fremitus and displacement of the heart

are the most valuable signs of pleurisy in such cases. Movable dulness, not always obtainable, is pathognomonic.

c. Pneumothorax in rare cases may give signs similar to those of pleurisy.

The diagnosis of pleurisy is incomplete unless the cause of the condition is also determined. A large proportion of cases of serous pleurisy are tuberculous. The following methods of determining the tuberculous nature were mentioned:

1. Finding tubercle bacilli in the fluid by staining the sediment.
2. By Jousset's method of inoscopy, *i.e.*, by digesting the clot and then staining.
3. By inoculating guinea-pigs.
4. By finding a coexisting tuberculous lesion in the lung.
5. By a cytogenic examination of the fluid.

Mention was also made of the Rivalta's acetic acid test, Landolfi's drug test, Müller's test with Millon's reagent, and the fermentation test. The treatment advocated was early tapping in cases of pleurisy with effusion. The dangers of tapping and the methods of avoiding them were also discussed.

LATERAL CURVATURE.

DR. W. G. ELMER.—Lateral curvature of the spine may be divided into three general groups: (a) The various postural curves of children and adults in which the lateral deviation and rotation are slight, and the spine still retains its flexibility although this may be somewhat impaired. The spine straightens out on lifting the patient by the head and the curves can also be largely overcome by voluntary effort on the part of the patient. These cases can be much improved and usually cured by systematic daily gymnastic exercises—symmetrical in the very mild cases—and both general and unilateral movements for the more pronounced ones. (b) This group comprises those patients which have advanced to marked lateral distortion and rotation of the spine but which still possess some mobility although this may be very much limited. We can improve these patients very much; not only can we arrest the progress of the deformity but if one patient happens to be a young and growing child we can do much to restore symmetry. In the case of adults with fully developed bony skeleton and complete

growth already attained, we cannot hope for very great improvement, although excellent results can sometimes be obtained by persevering effort. (c) This last group comprises the cases with advanced bony deformity, rigid spines and ankylosed vertebræ, for which nothing can be done. Sometimes a suitable jacket or brace will give support and relieve pain and prevent the deformity growing worse.

It is the second group of cases therefore which presents the greatest difficulties and which chiefly concerns us here. It is the children which especially interest us, for these are the patients we can permanently help and sometimes cure. Without treatment they must grow progressively worse.

Exercises alone will not answer. We can by this means so strengthen and toughen the muscular supports of the spine that we may hold the deformity in check, but we are not actually straightening the child. Our method is to secure what correction we can with horizontal traction on the head and feet by means of an apparatus especially designed for the purpose, the child lying prone upon a firm support. In this corrected position, the tension usually not being more than from 30 to 40 pounds, the child's body is immobilized in a plaster-of-Paris jacket. This is removed each day for gymnastic exercises, and various appliances are used to stretch and over-correct the distorted spine. About once every two weeks the plaster jacket is renewed in the same manner, and the spine gradually yields to the stretching and corrective manipulations, until at the end of six months we have reached either a condition of symmetry or very marked improvement. From a plaster jacket a plaster positive is made and upon this is moulded a light leather jacket which is worn for a year or two at a time and renewed when necessary to allow for the growth of the child. The exercises are continued, and the treatment must not be discontinued under several years. In fact the child should be kept under treatment and observation during the entire period of growth. The support may then gradually be given up.

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